Food Manufacture

Incorporating Canning, Packing, and Preserving

Vol. VII. **March, 1932** **No. 3**

Canned Wheat.

WE HAVE come across many varieties of tinned foods, but we must confess that canned wheat was not among them! It appears that a postmaster in Florida is seriously urging a Federal measure providing for the use of the wheat surplus for distribution in the form of canned wheat. He suggests a big establishment to cook wheat and can it in some cereal form, to be given to poor people, thus relieving hunger, providing employment for men engaged in processing the cereal, and in short order eliminating the troublesome wheat surplus for the benefit of farmers. He has submitted the matter to President Hoover, to the Farm Board, to Senator Capper, and to various other senators who are conspicuous for farm sympathies.

We are urged not to laugh, as we may be accused of a heartless disregard for hungry people or for lack of sympathy for farm improvement measures. Despite this it is difficult to suppress a smile and some measure of pity for the mentality that produced the idea. In all places at regular intervals we find emotional people trying to bring things back to normal by absolutely unnatural methods. We remember that not very long ago a well-meaning alderman of Wigan put forward a plan for establishing the finances of the town on a sound basis by creating a local currency! He believed in it and actually had some supporters. Canned wheat sounds a horrible thing, unless the canning is done in the rational way in a loaf tin! If the surplus must be distributed to the poor why not do it in the form of bread and create employment in the bakery trade? The worthy postmaster achieves a notable result—he relieves the farmer of the surplus of wheat and he fills the bellies of hungry masses with a glutinous concoction of tinned wheat, but he doesn't tell us who is to pay the farmer for his surplus, or the people engaged in processing the wheat. We suspected a snag somewhere.

Milk Powder.

On another page reference is made to the work of Williams and Hall on the effect of various dried milks on the flavour and texture of ice-cream. This calls to mind the work done by Lampitt and Bushill on the differences shown by milk powders made by roller processes and those made by spray processes in respect of the absorption of moisture (*The Analyst*, p. 778, December, 1931) and the effect of these differences on solubility. They found that roller-process powder absorbs moisture in a regular manner, but that spray-process powder first absorbs moisture and then loses it. This peculiar phenomenon is due to the lactose contained in the powder; spray-dried lactose itself absorbs moisture up to about 10 per cent., and subsequently loses practically the whole of this moisture. Other forms of lactose do not show this absorption and loss.

The effect of the absorption of moisture was shown to be the lowering of the solubility of the milk powder, the rate being dependent on moisture content and temperature.

Food Control in Holland.

It is always interesting to compare our own food regulations with those in other countries, and in this connection a paper on Food Control in Holland, by Van Raalte and Straub, in the January, 1932, issue of *The Analyst*, is of particular interest. Definite legal standards have been set up for foods and the hygienic conditions in places where food is made and

sold. Severe penalties are imposed for the sale of foodstuffs which may be injurious to health, or are of incorrect composition or are unsound. Foodstuffs are considered to be of incorrect composition not only when they are adulterated, but also when they are naturally defective, as, for example, if the proportions of their effective constituents are below the accepted standard for the trade. The Dutch Act, although described as the Pure Food Act, was in reality projected with a wider scope. Any article of commerce can by Order in Council be brought within the range of this law, and then has to comply with the conditions laid down in the Act—it must be of correct composition, in sound condition, and not liable to cause injury to health when used for its normal purpose.

Up to the present, articles other than food have been brought within the scope of the Act, such as all articles intended to be used in the packing of food and drink, wallpapers and curtains, toys, rubber articles for feeding infants, toilet articles and cosmetics, spoons, forks, and household implements, articles for washing and bleaching and for polishing and dyeing of leather, and substances for destroying insects and other noxious animals.

Let those who consider the English regulations complicated study the Dutch Act!

Flour and Bread.

With regard to flour, artificial colour, bleaching agents and baking powders are allowed. Alum is prohibited. The chemical standards are well below numbers for current trade qualities. The preface "egg" is allowed for products containing 55 gms. egg yolk or 150 gms. whole eggs per kilo. Bread is subjected to strict hygienic local control, and the weight of a loaf is based on a minimum weight of solids (240 gms.). White bread must have 240 gms. (or a multiple thereof) of solids, less than 2½ per cent. of salt and less than 1 per cent. ash other than salt. In the case of brown bread there must be 225 gms. (or a multiple thereof) solids per loaf and ash other than salt is allowed up to 2·4 per cent.

In the paper referred to, the specifications are given for bread, sugars and syrup, spices, preserved meats, marmalades, fruit juices, lemonade, tapestry, wallpaper, meat extracts, flour and starch products, coffee, tea, paper, honey, milk, cocoa, chocolate, margarine, detergents, beer, vinegar, oils and fats, cheese, ice-cream, wine, cider kapok, and eggs.

The definition of a fresh egg is rather amusing—a fresh egg is one which has not been submitted to any means of preservation—no time limit of storage is mentioned! The whole paper is worthy of the careful attention of all interested in food manufacture.

Dermatitis.

Dermatitis is a very serious problem in many of the food industries. Bakers' dermatitis is well known and has been the subject of considerable enquiry. Usually it is more prevalent than is generally admitted, because many cases, both among operatives and employers, are not reported. In one instance quoted at the Dermatitis Conference of the Milling Industry it was stated that in a large factory there were twenty cases of which only three were reported. The remainder were given other work until they recovered. In the case of bakers much of the dermatitis is due to carelessness and neglect.

The more one sees of the complaint the more one is convinced of the necessity of adequate washing facilities for properly removing dough and flour dust from the arms and hands, and the use of these facilities should be insisted upon. Another important point is the prompt and proper treatment of scratches and burns which are often the origin of attacks of dermatitis.

Another Source.

The incidence of the complaint is not confined to bakeries by any means; quite recently Horner has pointed out (*Lancet*, 1931, vol. 221, p. 961) that a dermatitis, often of a disabling degree, was found to affect a number of workers preparing oranges and lemons in the marmalade season, and the "peelers" were more affected than the workers dealing with the fruit juices, notwithstanding the fact that in the case of the former there was practically no contact with the juice. Although among "peelers" there is predisposition to injury through accidents with knives and other implements, and friction of the wrists and forearms, it seems probable that there is a more aggressive irritant in the peel of the fruit than the citric acid of the fruit hearts, and it is possible that the limonene present in the orange and lemon oils is the causative irritant. It was found that if the exposed skin was well oiled before beginning work injury was very rarely sustained, owing to prevention of damage to the horn cells from immersion in water, so that these remained healthy and resisted the action of limonene and citric acid.

From considerable investigation it seems quite definite that certain individuals are predisposed and very susceptible to dermatitis, and in such cases where frequently recurring attacks are noted the nature of the employment should be completely changed, so that the worker is not subjected to provocative conditions. It has been suggested that certain types of dermatitis are infectious, but there does not seem to be any authentic proof of this.

More News.

Commenting on the growing popularity of sausages in England, the *Chicago Daily News* supplies the following items of interest: "The sausage . . . has at last come into its own and now takes its place, together with the kipper and the finnan haddock, as one of the most useful and delicious standbys of the busy hostess.

"Not only have sausages, eggs, kidneys, and bacon now almost superseded the traditional cold supper at evening parties, but they have become the staple dish at women's luncheon clubs, and now they are considered a valuable adjunct to the cocktail party.

"On the whole, the present tendency is to return to simpler food. The other day at a fashionable grill the most popular dish consisted simply of a kidney wrapped in an onion."

Established Brands.

The inherent goodwill which attaches to an established brand is illustrated by a case reported from the United States, and, although it relates to food products that are not manufactured, it would yet seem to be of interest to the food manufacturer as an example of what effect the branding of a reliable product will have after the lapse of time.

For a number of years two brothers have been producing high quality vegetables on adjacent market gardens. Until recently they packed one of their specialities under the same label. This product was always of the finest quality; nothing but the best was allowed to go out. For years they were very prosperous, for their crops moved at good prices even in times of surplus. Recently the brothers decided to market their crops separately, one retaining the old brand, the other establishing a new one. The result was that the old-fashioned brand returned the equivalent of about a shilling a crate more than the new one at the market. The commission man knew that one man's product was as good as the other's, but he could not persuade buyers to pay as much for the new brand as for the one backed by nearly twenty years of unvarying quality.

Unwarranted Claims.

The American Medical Association has had for about a year a committee appointed to protect the public against fraud and objectionable advertising in connection with foods. Already 500 food products have been submitted to this committee, but, of these, the committee has only granted the use of the seal of the Medical Association to 75. The manufacturers are allowed to advertise them as "Passed by the Committee on Foods of the American Medical Association." The 425 others have been rejected tentatively on the grounds that the foods were adulterated or not wholesome, or were advertised in a misleading manner. No fee is accepted from the manufacturers for the testing and no information is accepted from them on a confidential basis.

Hydrogenated Fish Oils.

On another page will be found a short and simplified description of the purpose and method of hydrogenation for the hardening of oils. Those interested in the application of the process to fish oils will find useful information in H. N. Brocklesby's article recently published in the Progress Reports of the Biological Board of Canada.

He states that the natural oil, before hydrogenation, is put through a preliminary refining, as, for instance, by treatment with fullers' earth. Pilchard oil, however, contains very little of the natural impurities, and can be hardened by the use of a nickel catalyst with very small effect on the catalyst. By stopping the hydrogenation at a predetermined point, liquid oils, clear, odourless and tasteless, can be produced. Such oils are suitable for salad purposes, cooking, frying, etc., and under no circumstances does the fishy odour or taste ever return, if the process has been properly carried out.

As for food value, Mr. Brocklesby says investigations tend to show that, if a fat is hardened so that its melting point is far above body temperature, it will be relatively indigestible. The melting-point of hydrogenated fats can be controlled to a fine degree; but a common practice in manufacture of shortenings is to blend a fully hardened oil with softer fats or oils.

It has been found that shortenings containing considerable proportions of hardened pilchard, herring or sardine oils have superior qualities in baking: they tend to make pastry light and flaky and the crust of bread more crisp.

The Prince Rupert station is making further investigations in the technique of hydrogenation of fish oils for food purposes.

Canning in Chile.

It is said that there is a possibility of a fish canning industry being established in Chile in which British capital will play a not inconsiderable part.

Some years ago the Chilean Government decided to experiment with trout and salmon in the swift-flowing rivers which run from the Western slopes of the Andes into the Pacific. They imported rainbow trout, brown trout, and Rhine salmon.

The fish were introduced into three or four rivers, and flourished. They have now spread to the rivers all along the coast, and they abound in such quantities that a canning industry is being discussed.

Milk Control.

It is held by McIntosh and Whitly (*Lancet*, July 18, 1931) that the present method of analysis advocated by the Ministry of Health does not detect all viable bacteria, that pasteurisation by the "holding" method is liable to fail with regard to killing thermophilic and thermoduric bacteria, and that the "flash" method of pasteurisation is less open to the above objection, and at the temperature used (160° to 165° F.) is not only efficient but produces no detrimental change in the milk.

Oils and Fats.

We should like to congratulate Dr. Dore on the series of lectures dealing with "Some Aspects of Biochemistry," which he inaugurated at the South-Western Polytechnic last year. Dr. Colin H. Lea has recently delivered a course on "Some Recent Advances in the Chemistry of the Fats," in which he pointed out that the oil industry depends on empirical values, which provide little real information, and that if the nature of the various oils and fats is to be properly understood an attempt must be made to discover the exact fatty acids present and the structural formation of the triglycerides as they really exist. He pointed out that coco butter and mutton tallow have a very similar composition empirically, but that the nature of the fats is entirely different, due to the homogeneous structure of the former and the heterogeneous mixture present in the latter.

The normal tendency is for harder and more saturated fats to be formed in hot climates and for liquid unsaturated oils to come from cooler districts, a tendency which is distinctly noticeable even in members of the same species, when grown under different conditions. While palm oil and coconut oil come from tropical countries, linseed oil is produced in temperate regions; and in the same way, while the interior kidney fat of animals is hard, the back fat, which is exposed to atmospheric temperature, is much softer. Simple triglycerides do not appear to exist in natural fats, and it is on account of the distribution of the unsaturated fatty acids throughout all the glycerides that we have drying oils with their peculiar properties.

Rancidity.

In his second lecture Dr. Lea explained those changes taking place in storage, and which are commonly termed rancidity. These are due roughly to four causes: (1) The liability of fats to absorb foreign odours given off as decomposition products of other materials; (2) autolysis caused by the action of lipases; (3) action of micro-organisms with the formation of ketones and other bodies; (4) atmospheric oxidation, which may be accelerated by either heat or light. In every case of rancidity due to oxidation there is a more or less prolonged period of induction, when little change is noticed, but after that rancidity develops rapidly, although even now the senses of smell and taste are in advance of chemical analysis.

Turkish Yoghurt.

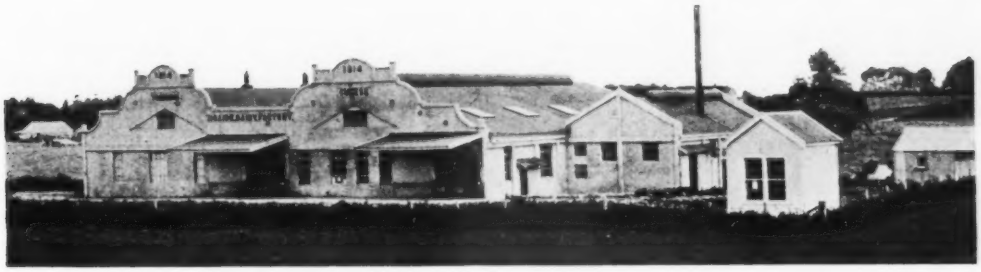
In the *Chemiker-Zeitung* of January 16, 1932, Professor Djevad Mazhar outlines the manufacture of yoghurt as practised in Stamboul at the present day. An essential to successful working is the maintenance of a rather high and constant room temperature (45° C.). After evaporation to half its original volume, with constant stirring, so as to avoid the formation of a layer of cream, the milk is immediately poured into special pans bedded in straw and allowed to cool to 40° C. before inoculating with the yoghurt culture. The latter takes the form of yoghurt which has been allowed to age for two or three days and which is diluted with a portion of the cooled milk before use. About 10 grms. of the culture suffices for each litre of the evaporated milk, and the fermentation proceeds with extreme rapidity, being completed in three to four hours under the correct temperature conditions.

The Flour Commission.

The certificate system by which the Government sought to secure the use of 15 per cent. of home-grown grain among all wheat milled for flour in this country has now been abandoned, and a new scheme is proposed under which the market for wheat will still be "free." Millers, flour importers, corn merchants, and farmers are to be registered, writes a correspondent, and a Flour Commission is to be established to sell licenses to mill flour and import wheat, while a Wheat Board will fix a statute price for home-grown wheat and act in an advisory capacity to the Minister of Agriculture.

The difference between the "statute" price for home-grown wheat and the price actually realised on the markets and paid to the growers, will be met by the funds resulting from the sale of the licenses. The amounts of wheat which each license gives permission to import and mill will be fixed and not unlimited; thus, a miller wishing to buy more wheat than one license permits will have either to buy several licenses which together cover the quantity of wheat he desires to buy, or possibly the licenses will be "open" ones, capable of being extended to cover any quantity on payment of a proportionate fee.

In order to make the position equitable, millers have asked for a duty on imported flour, but the authorities state that a measure of this sort could not be considered as a part of a quota scheme.



A Modern Dairy Factory.
(By courtesy of the High Commissioner for New Zealand.)

The Manufacture of Food Casein

By H. COURTNEY BRYSON

A detailed account of the methods employed in the manufacture of food casein, together with a discussion of the various uses which can be made of the material.

CASEIN FOR alimentary purposes is prepared by three methods, named according to the agent which is used to precipitate the casein from its dispersion in combination with calcium in skimmed milk. These three methods are:

1. Precipitation with acids: (*a*) Acetic acid; (*b*) hydrochloric acid.
2. Precipitation with rennet.

If milk is allowed to sour naturally, the lactose by bacterial action is converted to lactic acid, which precipitates the casein. The washed and dried curd forms the industrial lactic casein of commerce. Casein precipitated by sulphuric acid is used in the States but not in Europe. It is not suitable for alimentary purposes as the insoluble calcium sulphate formed simultaneously is not readily removed.

Casein is only manufactured when there is an excess of milk above that required for food, and is usually produced during the summer months. The yield of casein obtained varies, but is usually of the order of 3 per cent. of the skimmed milk. A large quantity of food casein is produced in France and New Zealand. The English production, mostly hydrochloric, amounts at the most to a few hundred tons per annum. French alimentary casein is mostly rennet.

Scrupulous cleanliness must be observed in the manufacture of food casein. Everything must be scrubbed and washed daily to prevent offensive odours which, even apart from hygienic considerations, are readily absorbed by casein.

In the preparation of alimentary casein on a commercial scale the fresh skimmed milk from the centrifugal separators is pumped by means of rotary pumps into large shallow wooden (or occasionally copper) jacketed vats provided with a gate valve, each holding 250 to 500 gallons, and then warmed up by means of steam to 95 to 150° F. The precipitating agent is then added, the curd allowed to settle and the supernatant liquor run off. The curd is then broken up if the coagulum is firm, placed in a masticator, and sodium bicarbonate added to render the casein soluble, till the whole mass is in a fine crumbly condition, when it is removed and placed on trays with bases of strong fabric resembling muslin. These trays are placed on a carrier and sent through a drying tunnel at a temperature of 130 to 140° F. The dried curd, which still retains some 8 per cent. of moisture, is then ground and packed.

Acetic Acid Method.

When acetic acid is used as a coagulating agent the pure acid is broken down with 50 per cent. of water and then added to the milk as quickly as possible, without stirring, to the extent of approximately three parts per thousand, keeping the temperature of the whole at 150° F. No matter how the acetic acid is added to milk the coagulum is always firm and coherent, rendering washing impossible. Since it is impossible to produce a flocculent precipitate, every endeavour is made to go to the opposite extreme and produce a solid and firm coagulum, and this is achieved as already stated by adding the whole of the acid as quickly as possible, which causes the curd to collect at the bottom of the vat as a tough plastic mass. The exact quantity of acid needed to produce complete precipitation is determined in the laboratory by previous titration of a test sample extracted from the vat. The quantity required is never twice the same, varying according to the time of the year, the breed and condition of the cows, the time since the commencement of lactation and the food on which the animals have fed.

After precipitation the curd is sometimes warmed up a little more in order still further to decrease its volume by syneresis.

The supernatant liquor is then run off through the gate valve and the curd removed and placed in drain racks to get rid of excess water before breaking up in a curd breaking machine. The best types consist of a combined shredder and beater. The shredding is performed by a slowly revolving cylinder fitted with sharp teeth that tear the larger masses into small pieces which fall into a rapidly revolving beater,

Receiving Milk at a Dairy Factory.
(By courtesy of the High Commissioner for New Zealand.)

which forces the curd through a medium meshed screen.

The curd is then put into the masticators, such as are used for dough mixing, with two internal blades revolving towards each other at different rates of speed. At this stage the casein contains approximately 50 per cent. of moisture, and is in a state resembling breadcrumbs. It will cohere if squeezed in the hand. A sample is taken to the laboratory and its "acidity" determined by titration with decinormal $NaHCO_3$, using phenolphthalein as indicator. The quantity of sodium bicarbonate required just to render the curd soluble, for each batch in the mixers, is then calculated, weighed out and mixed to a thin cream with water and added slowly to the mixer in the cold. The quantity varies greatly, depending on some of the factors previously mentioned as well as on the method of adding the acid and the state of the coagulum and the ambient conditions (temperature, humidity, etc.). It is usually of the order of 2 per cent.—*i.e.*, 1 kilo of sodium bicarbonate to 50 kilos of wet curd.

After mixing has proceeded for some twenty minutes the reaction is usually complete, and the material is then emptied from the mixers, placed on trays about three feet square with cloth bottoms, which are loaded on to trolleys, and sent through the long drying tunnels, along which is blown a current of warm air maintained at a temperature of 130 to 140° F. Vacuum driers are too expensive and tube driers too unreliable to be used. The best type of drier consists of a double-lined square wooden structure a trifle wider than the trucks. Four cubic feet of air per minute per pound of wet curd entering the drier should be allowed. The time required for drying depends upon the moisture of the curd, the fineness of the curd, and the temperature and volume of air passing over the curd. Excessive air speed must not be employed or the casein will be blown from the trays. Six to eight hours is usually required for drying. The trays of dried casein on emergence from the tunnel are emptied into a device which conveys it to the grinding mills. The temperature during drying should not be allowed to rise higher than 145° F., otherwise there will be a tendency for the mass to cohere and danger of discoloration of the product. If the temperature is too low, drying is unduly prolonged. About 8 per cent. of moisture is firmly retained by the curd. Grinding is usually carried out till the whole of the casein passes through a 120-mesh sieve, though occasionally 110, 100, or even 90 mesh casein is sold. The finer the grinding the lighter in colour the product and the more quickly it dissolves when added to water.

Hydrochloric Acid Method.

A rather different procedure is adopted if hydrochloric acid is used as the coagulating agent, owing to the difference in the nature of the precipitate, though the plant employed is the same.

The milk is warmed to a temperature not exceeding 150° F. as before and hydrochloric acid (one part pure acid to three parts of water) is added very slowly by spraying in thin streams with constant stirring, till the mass begins to clot. The required quantity is predetermined as in the case of acetic acid. The stirrers are then stopped and the curd comes down in the form of a flocculent precipitate, which is allowed to settle before running off the whey, from which whey solids or milk sugar may be recovered if required. The character of the curd is greatly influenced by the quantity of the acid added and the temperature at which it is precipitated. Incorrect handling or faulty control will result in a sticky curd or a soft one. The curd is then covered with warm water to which HCl is often added to depress the *p*H value to 4·6 (the iso-electric point of casein), which has the effect of keeping the curd very granular and easy to handle. The stirring gear is set in motion again for a short period. The curd is allowed to settle once more and the first batch of wash water run off. The washings are repeated till the wash water on testing is clear. Two or three washings are usually sufficient. The curd is then removed and placed on drain racks or channelled tables to remove as much water as possible, following which it is placed between burlap cloths in squares about four inches

thick, and a pile of such separated by dividing boards is placed in a simple wooden press actuated by a single start thread, and pressure applied slowly till the bulk of the excess water is squeezed out, leaving a damp curd containing about 50 per cent. of moisture. Cider presses are often used in this work and are quite efficient. All the wooden parts of the press should be kept well oiled with raw linseed oil to prevent water absorption.

On release of the pressure the curd is easily broken down to a crumbly condition and so is placed straight into the masticator. These mixers hold about one cwt. of wet curd each. A sample is sent to the laboratory, where the amount of $NaHCO_3$ required for solution is determined by titration as before, and the rest of the process is the same. Owing to the washing to which the curd is subjected, the "acidity" of the casein is not so high, and usually little over 1 per cent. of $NaHCO_3$ is required to effect solution.

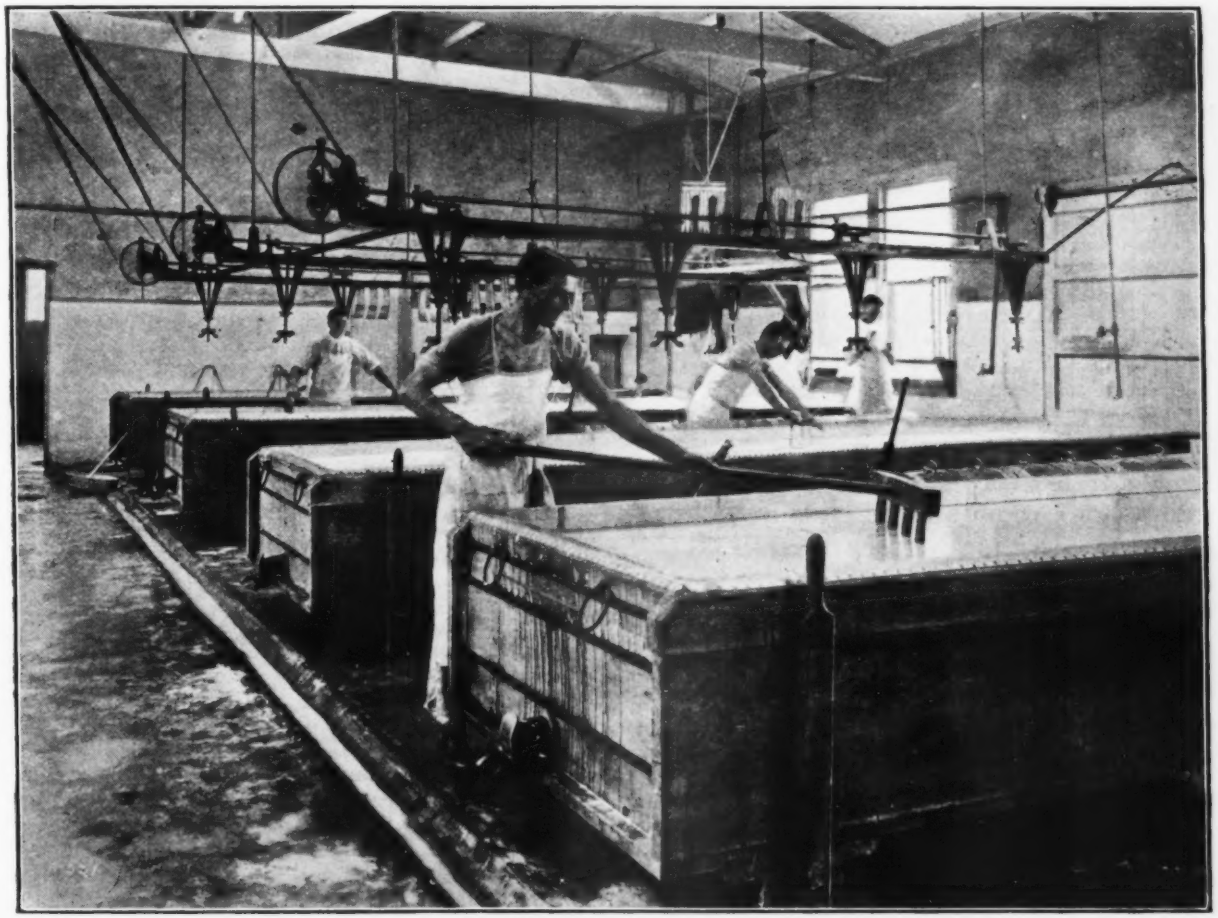
Rennet Method.

The character of the casein precipitated by rennet from milk is quite different from that precipitated by acids. Rennet will only act on non-alkaline or unboiled milk, for a high temperature or the presence of alkali causes a decrease in the amount of diffusible calcium, the presence of which is essential in order that the enzyme may act and throw down the calcium paracaseinate (rennet casein). The milk must be fresh and the amount of rennet required is approximately directly proportional to the freshness.

Rennet, the saline aqueous extract of the fourth stomach of a calf, is made up to 2·5 to 5·0 per cent. solution in water and added to the milk at the rate of 5 to 20 c.c. per gallon while the temperature is maintained at 104° F.

After the milk has set to junket the curd is cut up into nodules and the mixture heated to 150° F. to destroy the action of the rennin. For any given temperature the time required for precipitation varies inversely as the amount of rennet used, coagulation taking place with as low as 0·01 per cent. of rennet. The concentration and the percentage of rennet influence the character of the curd, the stronger the solution the more compact, firm, and dry the product. Below 65° F. or above 140° F. the action of the rennet is imperfect. The optimum conditions are generally round about 100° F., with the amount of rennet so adjusted as to give precipitation in twenty to thirty minutes. The addition of a small quantity of calcium chloride (0·01 per cent.) gives an increased yield (3 per cent.) and a better curd from which the whey drains readily.

During the reaction considerable experience is



Cutting the Curd in a New Zealand Factory.

necessary to adjust the stirring to the corrrect speed. The curd is allowed to settle out for ten minutes and the whey drained off through the gate valve. It is then covered with pure warm water at 77 to 95° F. and the mixture thoroughly stirred and the wash water run off. The washing is repeated once or twice, using a greater quantity of wash water each time. The curd is finally placed on drain racks and treated precisely as before. Owing to the extremely low "acidity" of rennet casein the amount of $NaHCO_3$ required is lower than either hydrochloric or acetic, and is usually, with a properly prepared product, less than 1 per cent.

The Spray Method.

It is interesting to note that besides these three methods of manufacturing food casein, attempts have been made to prepare it by means of a spray dryer such as the Krause Spray Dryer. The product produced, however, is so extremely fine and light that it is only wetted with great difficulty and so cannot be stirred into water for making beverages.

Electrolytic processes for preparing pure casein are too expensive to be commercial.

Uses of Food Casein.

Although the three products, the manufacture of which has just been outlined above, are described as "food casein," they are in reality the sodium salt of casein, except the material precipitated by rennet, which when treated with sodium bicarbonate becomes a calcium-sodium complex of casein.

Casein, though insoluble in water, is satisfactorily absorbed by the alimentary canal; sodium caseinate possesses the advantage of being water-soluble, equally nutritious, stable, and odourless. Casein is equal in food value to lean meat, but is free from purins, rich in vitamines, and superior to all other proteins in producing growth, possibly due partly to the fact that the phosphorus which it contains is utilised to the extent of fully 90 per cent. by the body.

With the increase of vegetarianism casein is finding a growing demand as a foodstuff. At the beginning of this century, sodium or ammonium caseinate was introduced as a patent food under various names. Some of these were highly exploited but possessed little special virtue save those already set out.

Foods of the Sanatogen variety contain 5 per cent. of sodium or calcium glycerophosphate added in solution to the milk before precipitation or to the curd before mixing with the solvent. Precautions must be taken to ensure that the product is quite free from moisture before packing, or hydrolysis is liable to occur. The anhydrous condition is obtained by treatment with alcohol and ether, care being exercised as casein can form addition products with these compounds. This type of food is free from fat and lactose. The Plasmon type of food, containing about 80 per cent. of casein, 5 to 10 per cent. of fat and lactose, and the same amount of sodium carbonate, is a yellow-white powder with a sweet odour, and is often added to flour for the preparation of special breads.

Infant foods are prepared by adding sodium citrate to casein, which increases the amount of soluble calcium by a reversible double decomposition, delays the coagulation by rennin or similar enzymes, and finally at coagulation produces a finer, softer, curd.

The casein is also often subjected to the action of the digestive ferments to render it more easily digested in the baby's stomach. Casein used to be recommended as a diabetic food, but to-day is being replaced by substances based on the carbohydrate tolerance of the patient.

Casein is also used as an egg substitute, especially for glazing and for soup tablets. Food casein, especially that produced in New Zealand, is very largely used for the manufacture of a special cheese in Germany and the U.S.A.

Considering that casein is an extremely good stabiliser for emulsions of the oil-in-water type, it is surprising what little use has been made of this in the manufacture of foodstuffs. In medicinal preparations casein is beginning to be more widely used. Ointments are usually of the water-in-oil type and, as the character of an emulsion is largely determined by the continuous phase, the antiseptic which is usually present in the disperse phase is of little value, as it does not come into contact with the skin.

Food casein is often used to help emulsification in the manufacture of face cream. "Rolling" creams often contain casein, as its adhesive nature assists in picking out the dirt. Whenever casein is used in the presence of water a very small quantity of a preservative—*e.g.*, thymol or 1 per cent. *para*-chlor-*meta*-cresol—must also be incorporated to prevent putrefactive bacterial decomposition.

The emulsifying power of casein has been utilised in the recent development of silver emulsions (to replace ointments) and colloidal dispersions of silver. Silver nitrate as an antiseptic is limited in scope on account of the irritation, pain, astringency, and corrosion accompanying its use. By combining silver with casein the degree of ionisation is greatly reduced, and the therapeutic properties of the metal are available with scarcely any irritant action—*e.g.*, gonococci are killed in a few minutes on exposure to a 0·5 per cent. solution of silver protein.

Ferric caseinate is used similarly as a tonic and for blood impoverishment. Bismuth formic iodide is a bismuth-casein compound largely used for dressing wounds.

Frozen Fruit Pulp

EXPERIMENTS in the food research division of the Bureau of Chemistry and Soils, U.S. Department of Agriculture, have developed a new type of frozen fruit pulp, which promises a new outlet for the fruit grower and packer, a new fruit base for the ice-cream manufacturer and soda-fountain operator, and a new product for direct consumption in the frozen state. By pulping the pitted fruit, adding a sugar syrup of proper concentration, mixing it thoroughly, and then freezing at very low temperatures, chemists have developed a product with a remarkably smooth texture and full retention of the original flavour. Experiments have included peaches, apricots, plums, cherries, pears, raspberries, and strawberries.

Physiological Milk: A Suggestion

By THOMAS McLACHLAN, A.C.G.F.C., F.I.C.

The following article opens up a hitherto unexplored field of opportunity for the manufacturer interested in milk preparations and puts forward a suggestion well worthy of serious consideration.

AT THE present time it is becoming increasingly difficult to obtain suitable supplies of milk for the manufacture of infants' foods, owing to the growing demand for fresh milk for immediate consumption in large towns. It will be appreciated that the chief considerations in the choice of a site for an infant food factory are a plentiful supply of fresh milk and, almost equally important, a site where transport, coal, power, and labour are readily available. One great drawback to the manufacture of dried infant foods is that, generally speaking, they are made in factories working factory hours on a five-and-a-half-day week basis, and a consequent demand for not more than a six-day supply of fresh milk. In order to overcome this difficulty some of the infant food manufacturers make arrangements with the larger dairy combines, by which each party helps the other one out with its excess milk supply. All milk is bought from the farmers on the basis of entire supply purchase; wholesale dairymen usually require more milk over the week-ends, and can also part with any excess mid-week supply to the manufacturer. At the same time there is the drawback that once the combine dairyman obtains a foothold he sometimes tends to convert it into a stranglehold on the manufacturer, who is forced to consider the possibility and advisability of obtaining new sites further from towns for his milk supply and to bring it to the factory by rail.

Milk Foods.

Although the greatest precautions are taken by all the large manufacturing companies in the preparation of milk products, to judge by the advertisements of their rivals there are considerable drawbacks to every preparation on the market at the present time. One is deficient in vitamins, a second contains air bubbles attached to its fat globules and tends to become rancid, a third has been overheated and the protein coagulated, a fourth has been dried under such conditions that the fatty emulsion has been broken and the fat rendered indigestible. Possibly one cause of the present tendency to acidosis among children may be due to the large fat globules they swallow in infancy from prepared artificial foods; one cannot say, it is merely a surmise.

When the first milk food was introduced to the market it was prepared in a more or less liquid condition, but the great drawback was that its keeping properties were small and its manufacturers soon developed a process by which it was possible to retain all the apparent advantages of their article in the dried state without the disadvantage of the constant wastage due to the material going bad and of the localised market necessitated by an unstable product. It would appear, however, that with more modern development of transport, machinery, and manage-

ment of herds, there is a possibility of a new lease of life for liquid infant foods. At the present time there are several grades and conditions of milk on the market, those prescribed by the Milk (Special Designations) Order, 1923, together with ordinary fresh cow's milk, sterilised milk, and homogenised milk, but it does not appear to have occurred to anyone that there should be a considerable demand for a reliable, standardised "Humanised Milk."

Physiological Feeding.

Many of the best-known pediatricians or infant feeding experts have for years recommended the practice known as "Physiological Feeding," which, in a nutshell, means the adjustment of the constituents of fresh cow's milk to make it resemble that of the human mother. This practice is carried out in many of our large hospitals and is advised in books such as those by Dr. Pritchard. Sir Truby King recommends an emulsion of mixed fats for addition to fresh milk in conjunction with milk sugar and water. On the other hand, it is a difficult and troublesome procedure to prepare a physiological feed in the home for each meal for the baby, and this, combined with the consequent wearing on the mother's nerves and the lack of cleanliness one frequently meets, have prevented the growth of this most beneficial practice. There appears to be no doubt that such an article could be marketed side by side with cow's milk through the usual channels by ordinary roundsmen belonging to dairies already established.

Canned Butter.

It would have to be decided which is the best method of producing such a milk for the market; there are several fairly reliable avenues open for exploration. At the present time it seems probable that the most suitable would be a combination of fresh milk homogenised with butter, milk sugar, lactalbumin, and pure water. The butter, or butter fat, could be imported from one of our Colonies, where cows are more exposed to sunlight than they are in this country; it could be obtained from tuberculin-tested animals, and hermetically sealed in tin cans till required for use. During the war a considerable amount of butter was canned and at the present time an artificial fat emulsion for use in infant feeding is canned, so that there is no reason why a return should not be made to this practice. Canning might even prove cheaper than boxes for bulk production, owing to the greater compactness and lighter weights involved in transport; moreover, cans should prove much more satisfactory than boxes in cold storage.

Other Ingredients.

Sterile milk sugar can be easily obtained, and there should be no real difficulty in preparing a more or less sterile lactalbumin, capable of resolution; a large quantity of it would not be required, so that even if it were rather an expensive item, its net cost would not be appreciable. Since butter fat melts at about 92° F. there would be no trouble in its emulsification at low temperatures; it is even probable that the process could be carried out at temperatures considerably below this, since butter fat is soft at 60° F., and it is not necessary for the fat to be entirely liquid in order to prepare a very good emulsion with it. The ever-increasing demand for regenerated cream shows that this product is supplying a long-felt want, and should provide a stimulus for "Physiological Milk."

If it should be desired to do so, the process could be carried out at the pasteurisation temperature of 145° F. and the milk cooled in the ordinary way. If the original ingredients were of an entirely satisfactory nature and the preparation carried out under strict bacteriological control, there does not appear to be any valid reason why this humanised milk should not be equal in every respect, so far as bacteriological count is concerned, to Certified or Grade A (Certified) Milk.

Advantages.

In view of the preliminary statement about the difficulty of obtaining suitable supplies of milk for infants' foods, some may be tempted to enquire how this particular process offers any distinct advantages, and it may be as well to deal with this point. In the first place, the preparation of "Physiological Milk" would have to be a seven-day one, since the product would always have to be delivered entirely fresh; therefore there would be no overlapping with the combine dairies in this respect. Moreover, it might be an industry with numerous centres in different parts of the country, each centre supplying a small, but definite, area. It might be possible to run these centres in connection with some organisation, such as the Grade A (Tuberculin-Tested) Milk Producers' Association, by which the purity of the basic milk could be guaranteed and by which means each product would serve to help the progress of the other one. Again, there could be no question of the destruction of the vitamins and enzymes present in the original milk, particularly if the whole process were carried out at comparatively low temperatures and the "Physiological Milk" cooled immediately. In fact, the incorporation of butter fat from parts of our Empire more favoured by the sun's rays than our own would actually ensure a higher fat-soluble vitamin content. There would be no alteration of any of the other constituents of milk such as may be involved in the present methods of preparing dried milks and, apart from this, the milk could be delivered in small bottles, so that the trouble of "preparing a feed" would be obviated, and this would prove a boon to many mothers. As regards price, there does not appear to be any reason why the cost should be much more than that of Certified Milk—that is, a penny or two a quart more than ordinary fresh milk—and this would compare most favourably with the price of any dried infant food on the market.

A little initial advertising propaganda would be necessary, particularly among doctors and infant welfare centres, but it is probable that, once established, the industry would require very little more advertisement than that generally bestowed on its elder sister, the dairy industry as at present established.

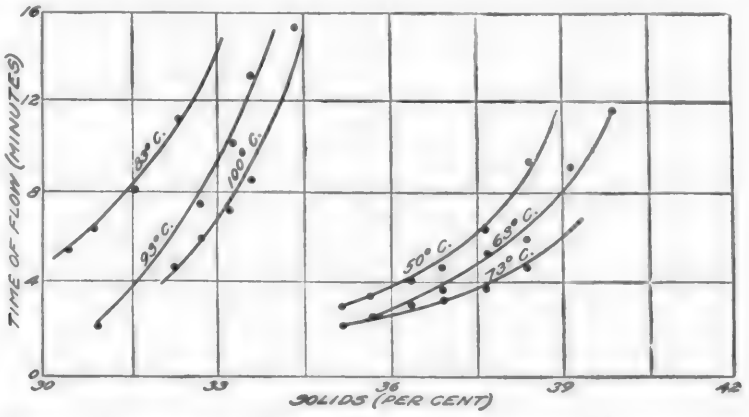
(*Continued on page* 83.)

Dry Skim Milk

ACCORDING TO O. E. Williams and S. A. Hall (*Circular No.* 179, U.S. Dept. Agriculture, issued August, 1931), more dry skim milk is being used in the manufacture of ice-cream. Dry skim milk is a new form of milk solids used in ice-cream making, and was first used by the industry in appreciable quantities about 1917; compared with sweetened and unsweetened condensed milk, the quantity is, however, small.

Williams and Hall set out to determine whether there is a difference in quality of ice-creams containing different types and forms of dry skim milk and ice-creams containing the better form of spray-dried skim milk and unsweetened condensed milk when representing over 80 per cent. of the serum solids.

It is well known that the colloidal properties (which depend largely on the degree of hydration of the casein particles) and the lactose flavours of milk solids in condensed milk, evaporated milk, and dry skim milk often vary, but it is not definitely known to what extent these variations are advantageous or detrimental to ice-cream. The purpose of the investigation is to show the effect that some of these common variations in the character of the milk solids from different sources may have on the flavour and texture of medium-rich ice-cream.



Effect of Forewarming of Milk upon Viscosity of the Solution of Reconstituted Dry Products. (From Grewe and Holm.)

Two distinct types of dry skim milk are used in the manufacture of ice-cream—namely, spray-dried and drum-dried. The spray-dried product has a fine, smooth, velvety texture and is usually very soluble. The drum-dried product is coarser, more granular, and generally less soluble. There are also different characteristics that are not generally recognised in each type. In this experiment some of these characteristics have been studied in what may be termed two forms of spray-dried skim milks which were prepared under different heat treatments.

Grewe and Holm (*Cereal Chem.*, Vol. 5, p. 461, 1928) have shown that the body of the solution of a reconstituted spray-dried skim milk (see illustration) is affected by the heat treatment of skim milk prior to desiccation. These investigators measured the viscosities of six dry milks which had been prepared from skim milk forewarmed at temperatures of 50°, 63°, 73°, 83°, 93°, and 100° C., respectively, and showed that there is a decrease in body (viscosity) with forewarming temperatures of 50°, 63°, and 73°, a marked increase at 83°, and again a slight decrease at 93° and 100°. On comparing the viscosity determination for the solution of reconstituted dry milk heated at 63° C. (145° F.), which is the common heat treatment used in forewarming prior to drying, with the maximum viscosity, obtained at a temperature of 83° C. (181° F.), it was found that these viscosities have a ratio of 5 to 4. This indicates that there was a greater hydration in the latter or, as shown in the illustration, that a lower concentration was necessary to produce the same viscosity.

This difference in the hydration of these two dry milks produced by heating the milk during the forewarming process to the temperatures mentioned for 30 minutes results in what might be termed two different forms. These forms are designated herein as form A and form B, and for convenience are also referred to as spray A and spray B.

Since there are marked differences in the physical properties of spray-dried and drum-dried milks, and also in the different forms of each type, it is important to know which of these products is the more suitable ingredient for ice-cream and which form of dry skim milk is more suitable.

Tests showed that the flavour and texture produced by spray B dried milk were more desirable than those produced by either the drum or spray A dried milks.

The final conclusions reached by Williams and Hall were as follows: (1) That various milk solids not fat used in manufacture of ice-cream differed in their ability to impart desirable properties to the ice-cream; (2) that of the dried skim milks used in ice-cream the most beneficial was the spray type, particularly the one in which the milk was preheated at 83° C. prior to drying; (3) that this dried skim milk was also a better ingredient for ice-cream than the three forms of unsweetened condensed skim milks used; and (4) that condensed skim milk when superheated improved the quality of ice-cream more than when it was not superheated or was forewarmed at 83° C., but did not improve the quality of ice-cream as much as spray B dried skim milk.

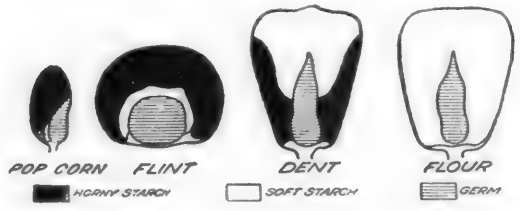
We wonder if Williams and Hall have seen the paper by Lampitt and Bushill, which appeared in the *Analyst* (p. 778, December, 1931).

Pop Corn

The following is taken from a report recently issued by the U.S. Department of Agriculture (Farmers' Bulletin No. 1679), and written by A. M. Brunson and C. W. Bower.

THERE IS evidence that pop corn was known and used by the Indians of both North and South America before the coming of the white man. Its importance as an article of commerce has developed since about 1889. More recently, the use of pop corn confections, etc., has greatly increased the demand for a reliable bulk product and has made a profitable outlet for those who desire to grow it on a commercial scale. Now the development of the small electric popper has given an added impetus to the use of pop corn in the city home.

All starchy corns may be placed in one of the four classes—pop corn, flint corn, dent corn, or flour corn—on the basis of the distribution and relative proportions of horny and soft starch in the endosperm. The endosperm of the best strains of pop corn is corneous or hard throughout or contains only a small core of soft starch near the centre (see illustration). In flint corn the endosperm consists of a small quantity of soft starch, near the embryo, completely surrounded by corneous starch. In dent corn the corneous starch is confined mainly to the



Diagrammatic Representation of Location and Relative Proportions of Horny Starch and Soft Starch in the Four Main Classes of Starchy Corn.

sides of the kernels, soft starch constituting a larger proportion than in flint corn. In flour corn the endosperm is practically all made up of soft starch and contains only traces of hard starch.

The popping properties of the different kinds of corn follow rather closely the relative proportions of hard or corneous starch in the endosperm. Pop corn, with the greatest proportion of hard starch, is far better than the others in "poppability." Flint corn may pop poorly to fairly well, depending on the strain. Dent corn rarely will pop, though occasionally a few kernels will pop feebly. Flour corn will not pop at all.

The popping process is due to the sudden liberation of pressure produced by steam generated within the kernel. The source of the steam is the moisture contained in the kernel. The colloidal matrix in which the starch grains are embedded within the cell confines this steam until the pressure becomes great enough completely and suddenly to rupture the original structure.

The quality of pop corn depends upon its flavour and tenderness. A large expansion during popping is closely associated with tenderness and is desirable also because it means a large volume of the finished product from a given quantity of pop corn. Popping expansion depends upon three major conditions: (1) The inherent structure of the kernels; (2) their moisture content; and (3) the proper application of heat.

Just as pop corn pops better than flint corn, so pop corn having the least soft starch in the kernel pops better than that having more soft starch. This freedom from soft starch, indeed, probably is the most important characteristic determining the popping quality of different strains.

Good expansion during popping may be expected from pop corn containing from 12 to 15 per cent. of moisture, the best moisture content being 13 to 14 per cent. The volume expansion decreases rapidly for samples having less than 11 or more than 16 per cent. of moisture. Corn at these limits can be popped successfully, therefore, only if it is first treated so as to increase or decrease the moisture content. Pop corn containing too much moisture will dry rapidly if exposed to the air in heated rooms. The moisture content can be increased, on the other hand, by sprinkling very lightly with water, just enough to dampen the kernels slightly, and then storing the corn in tight containers 24 to 48 hours, or until this moisture is thoroughly absorbed. In general, pop corn stored where it is in contact with the outside air will have a moisture content suitable for popping.

In popping corn the heat should be applied evenly and neither too quickly nor too slowly. Best popping occurs when heat is applied so that popping begins in about one and a half minutes.

Pop corn and field corn require the same kinds of soil and climate and the same general methods of cultivation for successful production.

The best yields of pop corn come from productive soils that are not too light or sandy and contain abundant organic matter.

The essential requirement in cultivating pop corn is to control weeds. Much of this can be accomplished cheaply by using harrows, weeders, and similar tools before or immediately after the pop corn plants emerge.

A productive soil and thorough cultivation are even more important in the production of pop corn than of field corn, because pop corn value depends largely upon quality, and poor growing conditions are reflected in poor quality as well as in low yield.

The production of pop corn is a highly specialised business, and profits depend at least as much upon the ability to market successfully as upon growing the crop.

The Hydrogenation of Oils and Fats

By H. M. LANGTON, M.A., B.Sc., F.I.C.

A brief account of the salient features of hydrogenation, the process whereby liquid oils are converted into solid fats.

HYDROGENATION IS a process whereby a part, or, in some cases, almost all the unsaturated acid part of the molecules forming a fatty oil is converted into a saturated acid part. Chemically, the process may be exemplified by the conversion of olein into stearin, thus:

$$(C_{17}H_{33}.CO.O)_3.C_3H_5+3H_2=(C_{17}H_{35}.CO.O)_3.C_3H_5$$

Expressed in non-technical language, the problem resolves itself into one analogous to the conversion of an oil like olive oil into a fat like lard or beef stearin. Of the numerous processes which from time to time have been devised for effecting such a conversion, hydrogenation is the only one to attain successful commercial issue. Normann found nearly thirty years ago that reduced nickel oxide (the catalyst), suspended in fatty oils at a suitable temperature in the presence of hydrogen gas, effected the chemical combination of the fatty oil and the hydrogen—*i.e.*, brought about hydrogenation. Most of the familiar nickel powder or batch processes in use at the present time for hydrogenation are based on Normann's original patent, which is discontinuous in operation and necessitates an elaborate series of preliminary processes to produce nickel powder of the required degree of activity. On completion of the hydrogenation the nickel powder has to be removed by filtration, and its reconversion into the active catalyst necessitates the original series of operations all over again.

The continuous process of Bolton and Lush (Br. Patent 203,218) introduced a few years ago the novel method of reactivating the spent nickel catalyst by anodic oxidation—a method somewhat like the charging of an electric accumulator. For convenience, the nickel in the form of turnings is made up into cartridge-like cases which really form an integral part of the plant. The operation of the process is truly continuous, control of the composition of the hydrogenated product is assured, no filtration of catalyst is necessary, and any particular part of the oil is heated for only about ten to fifteen minutes during the time it is actually undergoing hydrogenation. This process is particularly useful in that small economic units can be operated—even down to five tons a week. The continuous process is found invaluable where only slight hydrogenation is necessary, as in the following cases: That of cacao butter to prevent the subsequent "blooming" of chocolates; to prevent the development of rancidity in tallow and lard; to stabilise butter fat without at the same time destroying or impairing its flavour; to bleach palm oil for edible purposes without hardening it.

Hydrogenation has rendered possible the production of fats of very varied consistency, and therefore of greater suitability according to the melting-point and consistency required. The field of usefulness of such products seems an ever-expanding one in consequence. Such well-known vegetable oils as cotton seed, groundnut, sesamé, rape seed, and sunflower seed are regularly hydrogenated in large amount. In India and other parts of the East perfectly satisfactory artificial ghee is being produced from the soft oils by hydrogenation. Coconut and palm kernel oils are slightly hydrogenated when required for special purposes. Past prejudices against the use of hydrogenated fats have now almost disappeared; they are certainly no longer justified in any way. Only the highest grades of oil, and those only after preliminary refining, are hydrogenated, and the resultant fat is in every case satisfactory, because of its bland flavour, its consistency, and its keeping qualities.

Very large quantities of the highest grades of whale oil, and to a small extent high-grade fish oils, are hydrogenated and find an outlet in the edible fat industry. Refined, hydrogenated whale oil is a hard, white fat free from all odour and taste, and perfectly wholesome and sweet. Its keeping qualities are much superior to those possessed by beef stearin, for which it is being used as a substitute to an increasing extent. It makes a satisfactory shortening product, particularly when blended with other fatty oils. It finds use to a limited extent in the margarine industry.

Beans in Tomato Sauce

THE canning of dried imported beans with or without the addition of pork and tomato sauce has now become an important business in the United Kingdom. The pioneers of this industry, states a correspondent, had a special process for treating, baking, and processing their beans, but some of the more important packers in this country have made considerable headway during the past year. Both production and consumption are rapidly growing.

From experiments made, it seems that the Canadian pea bean is the most attractive, both from the packers' view-point and the public's, but supplies of the Canadian bean find a ready sale in the U.S.A., and with the depreciated pound sterling, while it is almost possible even now to import the Canadian bean, the most popular and satisfactory alternative is a bean from the Danube. These beans are described as Pearl beans, and it is important that the grading and picking of them should be well done. The Japanese Ohtenashi can be used, and, in fact, are used, for the cheaper packs, but the Kotenashi (also Japanese) are never used. Rangoons are unsuitable. Canadian pea beans can be supplied in the United Kingdom (*vide* the *Food Industries Manual*), and canners considering packing this product are recommended to refer to this guide, as proper picking, grading, and selection of the bean is essential for good results.

The Bacteriology of Common Salt

By WILLIAM CLAYTON, D.Sc., F.I.C.
Chief Chemist and Bacteriologist to Messrs. Crosse and Blackwell, Ltd.

A series of articles reviewing present knowledge in relation to the bacteriological action of salt. Part IV. will deal with the salting of fish, Part V. with the brine fermentation of vegetables for pickles, and Part VI. with the salting of butter and margarine.

PART III.—SALT TOLERANCE

THE IMPORTANCE of a thorough knowledge of the salt tolerance of micro-organisms commonly found in the air, water supply, dirt, fæcal matter, etc., is self-evident when one considers the commercial use of salt in curing fish, brining meats, fermenting vegetables for pickles, and salting butter and margarine.

The subject is receiving increasing attention, but the published data contain many discrepancies and are far from complete. The usual textbooks on bacteriology ignore this field, while the bacteriologist faces the distinction between salt tolerant and obligate halophilic strains.

The Brining of Meats.

Meats in various forms, such as hams and tongues, are commonly pickled in sodium chloride solutions of 20 per cent. strength or even in saturated brine. Sugar is added for flavour and saltpetre for the development of reddening on cooking. As a rule, no *p*H control is effected, although an acid reaction avoids the undesirable mycoderma films. A thin layer of oil, such as medicinal paraffin, is frequently employed to the same end.

In an extensive investigation of brines used for curing hams, Sturges and Heideman* isolated 101 strains of micro-organisms varying in their salt tolerance, cocci predominating. Incidentally, cocci are by far the most common forms seen in studies on halophilic character, a conclusion recently confirmed by Miss Robertson† in her research on the salt tolerance of organisms found in dirt and putrefaction.

Pointing out that the organisms from ham-curing brine did not fit into any existing scheme of classification, Sturges and Heideman proposed a non-morphological classification based only on growth factors in relation to salt concentration. Thus:

Group.	*Title.*	*Salt Relations.*	*Types of Organisms.*				
			Cocci.	Rods.	Yeasts.	Vibrio and Spirillum.	Total.
I.	Salt obligate	Require 1 per cent. NaCl for growth	—	1	—	12	13
II.	Salt preferential	Grow more luxuriantly in 1 per cent. NaCl media than in standard media	—	13	—	11	24
III.	Salt facultative	Grow equally well in standard media and in 12 per cent. NaCl media	32	8	4	—	44
IV.	Salt tolerant	Grow in 12 per cent. NaCl media, but not as well as in standard media	—	5	—	—	5
	Not classed		—	15	—	—	15

* *Abst. Bact.*, **7**, 11 (1923); **8**, 14 (1924).
† *Journ. Hygiene*, **31**, 84 (1931).

From meat-pickling brines, a Gram-negative, nitrate-reducing organism was isolated, motile, non-sporing, growing well at low temperatures and in 15 per cent. NaCl media. It exhibited weak fermentative powers without gas and it did not liquefy gelatin. From viscid brines or "ropy pickle" four organisms were isolated, growing in 15 per cent. brine at *p*H 8, but inhibited at *p*H 6 or below.

An important paper by Horowitz-Wlassowa* appeared in November, 1931, under the title: "On the Rôle of the Various Micro-Organisms in Pickling-Brine, with a Discussion on the Question of Halophiles in the World of Bacteria." This worker has published several papers in Russian, and the present summary is therefore of very considerable interest. The present writer's conclusion in Part II. of this series that air contains facultative halophiles is experimentally substantiated by Horowitz-Wlassowa, whose general results are as follows:

The reddening of meat in nitrate-bearing brine (25 per cent. NaCl) is due to denitrifying organisms. Old pickles show on the usual agar medium up to 10,000 colonies per c.c., mostly cocci, which exert a denitrifying action—*e.g.*, in bouillon which contains nitrate. However, these organisms are *not* concerned in pickle, since 18 per cent. or more NaCl inhibits their action. If now old pickle is tried with 10 per cent. NaCl agar, colonies appear which give gas in nitrate media.

Horowitz-Wlassowa distinguishes between obligate halophiles and halophiles. The latter group, corresponding to Sturges and Heideman's salt facultative group III., thrive equally well on the usual media and on such media containing salt. Obligate halophiles, demanding sodium chloride in the media, he terms Halobes—*e.g.*, *B. halobicus* n. sp., small rods, motile, Gram-negative, obligate aerobe, non-sporing, 1·5 to 2 μ long and 0·7 to 0·8 μ wide. On 10 to 12 per cent. NaCl agar the growth is luxuriant, juicy, colourless (or sometimes brown), and iridescent. A medium containing 25 per cent. gelatin and 1 to 5 per cent. NaCl gives round, smooth-edged, fine-grained, non-liquefying colonies, the stab culture being needle-like with a juicy summit. While with glucose there is produced acid and no gas, there is no fermentation of lactose, maltose, or saccharose. Albumen media show no NH_3 or SH_2, but fat is split and starch is destroyed.

Besides *B. halobicus* this author, with Sontag, has isolated another obligate halophile from salted pike-perch and salted anchovies—viz. *Vibrio halobicus desulfuricans*. Thirty halophiles were isolated from brined meat, pickle, salted gut, salt, and caviare. Only few organisms were found to thrive on 20 to 25 per cent. NaCl media, mostly Gram-positive cocci

* *Zeits. Untersuch. Lebensm.*, **62**, 596 (1931).

—*e.g.*, *M. flavescens*, *M. cereus albus*, and *Tetracoccus carmens halophilus*. Next come sporing Gram-positive rods, such as *B. mycoides*, *B. corrugatus*, and *B. lacca*, which thrive on 10 per cent. NaCl media. Their proteolytic action diminishes at higher NaCl strength, but their denitrifying action is not impaired. From the air of Leningrad 15 strains of halophiles were isolated, 12 being coccal forms, growing well on 10 per cent. NaCl media.

Between the halobes and the halophiles, Horowitz-Wlassowa noted transition groups, growing slowly and sparingly on 15 to 20 NaCl media—*e.g.*, a strain akin to *M. citreus agilis*. In pickling-brines he found, in addition to halophilic denitrifying strains, two other important groups:

(A) Developing a peculiar fermentation forming acetylmethyl carbinol. Included here are *B. subtilis*, *B. mesentericus*, and *B. corrugatus*, their development arising when the brine falls in salt concentration, since they grow when the NaCl percentage is 15 but not when it is 20. These organisms ferment the sugar used in the pickle and also the glycogen in the meat.

(B) Lipolytic strains causing "slime" on brined meat. This "slime" condition occurs in hot weather and is almost always a pure culture of a coccus. On the usual media the coccus is 0·8 to 0·9μ diameter, and is found singly, in pairs, and in masses. It is Gram-positive and non-motile and the author names it *M. lipolyticus*. It grows on 16 to 18 per cent. NaCl media, even though scantily, but it is killed at 20 per cent. NaCl strength. The original paper gives a full description of its growths on the usual laboratory media.

Grapefruit Preserves

By JOHN ELSBURY

1. Grapefruit Marmalade (Virginian).

Grapefruit	28 lbs.
White sugar	56 lbs.
Sufficient colour to tint rose-pink	
Clear port wine ...	½ pint

Place the grapefruit in boiling water and scrub clean, cutting away any dark spots. Cut, skin-deep only, into four quarters and peel. Cut the peel into thick chips and place them in a preserving pan with enough cold water to cover, keeping the chips loose. Now simmer gently until the chips are quite tender (about two hours) and skim well.

Cut the dummies in half and place them in a pan with sufficient water to cover them. Gently boil until the pips come out clean between finger and thumb. Pass the pulp through a sieve (mesh, 5-6 to the inch).

Drain the chips and add them to the sieved pulp; the total should now amount to 6 gallons. Place the mixture in a pan with 56 lbs. of sugar. Stir well until the sugar is all dissolved. Gently bring to boiling-point; simmer and skim. Colour rose-pink just before completing the boil, at about 222° F. and finish at 223½°. Allow to stand in the hand-pan a little time and add the port wine. Fill into jars. The yield should be 80 lbs.

2. Golden Grapefruit Marmalade (Virginian).

Grapefruit	28 lbs.
White sugar	56 lbs.
Essence of sweet orange	1 oz.
Sufficient colour to produce a golden tint.	

Proceed as in No. 1, except as regards addition of colour and port wine.

3. Spiced Grapefruit.

Grapefruit	28 lbs.
White sugar	56 lbs.
Water	28 pints
Stick cinnamon ...	14 ozs.

Scrub the grapefruit clean in hot water; cut into four parts and peel. Cut the peel into thick chips. Put water, chips and cinnamon into preserving pan, and gently simmer until quite tender (about four hours). Pass pulp through a sieve to remove pips and pith. When the chips are cooked, put in sugar and pulp and stir until the sugar is dissolved. Boil gently until mixture thickens.

It can be served as a sauce with turkey and duck, or with lamb and beef. It is also excellent as a preserve with biscuits or bread and butter.

This recipe (presented by the present writer) was awarded a prize of one guinea by the *Daily Telegraph*.

Industrial Advertising

A STRONG tribute to the power of industrial advertising was paid by Mr. Frank Gardner of Messrs. William Gardner and Sons (Gloucester), Ltd., at the firm's annual dinner, which was held on Friday, January 29, and which was attended by the Mayor of Gloucester, the Member of Parliament for the city, and other eminent guests.

Commenting on the fact that they had had a successful year—a very strong contrast to the position in which many engineering firms find themselves—Mr. Frank Gardner spoke of the great part played by industrial advertising properly directed, and referred to their advertising agent, Mr. Leonard Hill, who was present with them that night and who, during the last three years, had assisted in the prosperity they had enjoyed during that period by making what they had always regarded as a somewhat unnecessary expense prove one of the most profitable of their spending departments.

Later in the evening Mr. Leonard Hill responded. Congratulating the directors of the firm as being among the few clients he served who had increased their advertising expenditure for the last year or two, he indicated a greater future for the more highly specialised journals catering for specific trades, and said that it was by the careful choice and use of such mediums that the advertising of this great West Country firm had been made so profitable.

St. Vincent, B.W.I.

Arrowroot

By H. STANLEY REDGROVE, B.Sc., A.I.C.

A general discussion of the source, manufacture, properties, and uses of arrowroot. There seem to be possibilities in further developing the consumption and uses of this product.

ONE HAS only to mention the word "arrowroot" to obtain some such comment as this: "Yes! An excellent food for invalids." It is. But, all the same, I believe that over-emphasis of its suitability for the purpose is largely responsible for the neglect of arrowroot as an excellent form of starch for general dietetic use.

Apparently, the word "arrowroot," in Great Britain, may designate almost anything of a starchy character; but it is well understood that genuine arrowroot, with which alone I am concerned, is the product of the rhizomes of certain *Maranta* species, especially *M. arundinaceæ* L., monocotyledonous plants belonging to the natural order *Marantaceæ*, native to tropical America and the West Indies.

The name is said to be based on the fact that the Indians used the roots of the plants as an antidote against poisoned arrows; whilst, according to another account, it is a corruption of an Indian word meaning "mealy root." *M. arundinaceæ* is a small herbaceous plant, usually attaining a height of about two to three feet. It produces an abundance of large leaves arising directly from the root-stock. Underground, tuberous rhizomes are produced, which attain a length of about a foot. The upper ends of these, which are not particularly rich in starch, are generally cut off and used for purposes of propagation, being planted about six inches deep in rows. The plants thrive best in a light, rich soil. Excess of rain is detrimental to them. They come to maturity in about ten months. The flowers, as they form, are cut off to assist the formation of good tubers.

The plant has been cultivated in several tropical countries, including India and Natal, in addition to the West Indies. At one time, Bermuda had the reputation of producing the finest arrowroot. To-day, the British island of St. Vincent has a virtual monopoly of arrowroot production. The amount exported annually is rather variable, but 30,000 cwts. may be taken as an average figure, the United Kingdom, U.S.A., and Canada being the chief consumers.

The manufacture of arrowroot from the rhizomes is relatively simple. The tubers, after removal of the top joints for planting, are scraped to remove the outer fibrous covering and washed, after which they are reduced to pulp by means of rather primitive grating machines. The pulp is then washed in a current of water in a series of perforated trays. The water carries away the particles of starch, which, after thorough washing, are allowed to settle. The starch is finally dried.

The excellent qualities of arrowroot, its whiteness

and purity, are, no doubt, largely dependent on the care with which the washing is conducted. Nevertheless, production could be much facilitated by the introduction of modern machinery. Efforts are now being made towards the achievement of this end.

Starch, from whatever source it is obtained, always occurs in the form of particles of more or less definite size, showing some semblance of organised structure. Starches obtained from different plants differ considerably in the size of their particles. Those of arrowroot range from 13 μ to 70 μ in length, most of them having lengths of from 27 μ to 54 μ (Eynon and Lane, *Starch: Its Chemistry, Technology, and Uses*, Camb., 1928, p. 85). In general, therefore, whilst its particles are smaller than those of potato starch, they are larger than those of the common cereal starches, such as cornflour, wheat starch, and rice starch.

It is no doubt the whiteness of arrowroot that renders it specially suitable, wheat starch alone being superior in this respect, for the preparation of glycerinum amyli for use in the manufacture of cosmetic creams. Arrowroot, finely ground, is also employed as a basis for theatrical face powders.

So far as purity is concerned, analysis has shown that arrowroot contains about 84 per cent. of starch, the balance being mainly water. Only quite minute quantities of protein, mineral matter, and fibre are present, and fat is either entirely absent or present to an extent not exceeding two parts per ten thousand. The ash contains the phosphates, silicates, and chlorides of calcium, potassium, and iron. The following figures have been published:

ANALYSIS OF ST. VINCENT ARROWROOT.

	Campbell.	*Willimott.*
Water	15·24	15·15
Protein	0·72	0·10
Fat	nil	0·02
Starch	83·82	84·45
Fibre	0·04	0·03
Ash	0·18	0·25

Where an easily digested, purely energy-forming foodstuff is required, these figures indicate that arrowroot is as nearly ideal as could be desired. Moreover, in a paper published some little time ago in the *Lancet* (August 10, 1929), Dr. J. Campbell attaches importance to the fact that the gelatinising point of arrowroot (73° C.) is higher than that of other common forms of starch, as a factor ensuring its easy digestibility. He has also stated that an examination of various commercial starches revealed the fact that they all gave an acid reaction, with the exception of so-called "British arrowroot" (potato starch), which gave an alkaline reaction, and St. Vincent arrowroot, which alone was neutral.

Another point of interest, indicating the possible presence of a vitamin, or similar substance, in root starches including arrowroot, is the fact that arrowroot and potato starch have been found capable of balancing a deficiency when rats are fed on dried protein, a property not possessed by such cereal starches as those of wheat, rice, and maize (cornflour).

But, if arrowroot is particularly suitable for use in the feeding of invalids, its special character does not, by any means, render it inferior to cornflour or other starches for general dietetic purposes. The Empire Marketing Board has endeavoured to popularise its employment by housewives by the publication of a booklet (*Empire Recipes*, Series III) containing recipes for arrowroot dishes of a most varied character, including biscuits, cakes, puddings, jellies, soups, sauces, etc.

The task, however, is not an easy one; for not only is the retail price of arrowroot higher than that of cornflour, but there is the curious delusion to be overcome that arrowroot is only suitable for invalids and children. Food manufacturers, it is to be hoped, are free from any prejudices on the matter, and might well make greater use of arrowroot. Here, it is true, price is important and is not to be overweighted by considerations of patriotism. But price, to a large extent, depends upon demand and, this is important, the adoption of efficient methods of growing and manufacture. It seems probable that, with an increase in the demand, especially an increase that would justify the installation of modern plant for the production of arrowroot, it could be marketed at a competitive figure. Nicely flavoured, put up in pretty containers, and given an attractive name, arrowroot would make quite a different appeal to the housewife from the relatively restricted one it seems to exercise at present.

German Book on Fruit Canning

A FEW months ago Dr. H. Serger and Hans Kirchhof published a small handbook of 158 pages on the canning of fruit. Even to those unable to read German, this should prove interesting and instructive, since it is well and profusely illustrated with plant and equipment, thereby enabling one to compare German machinery with corresponding British and American examples. In many instances the German machines compare unfavourably with those one commonly finds here or in the States in respect of substantial construction. ("*Früchte-Konservierung. Kompotte in Dosen und Gläsern, Mit Anhang Vorkonservierung der Abfallprodukte.*" *Von Dr. H. Serger und Hans Kirchhof. Braunschweig: Dr. Serger und Hempel*, 1931.)

FIG. 1.

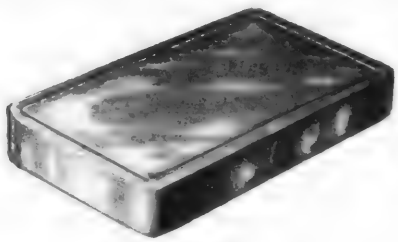


FIG. 3.

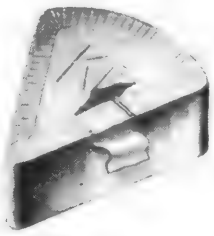


FIG. 2.

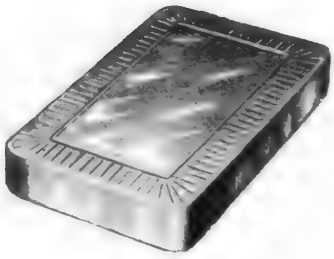


FIG. 4.

FIG. 5.

FIG. 8.

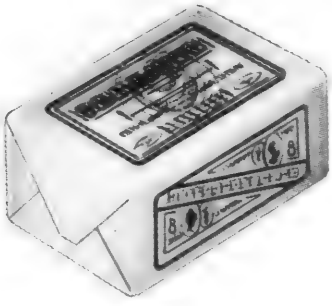


FIG. 7.

FIG. 6.

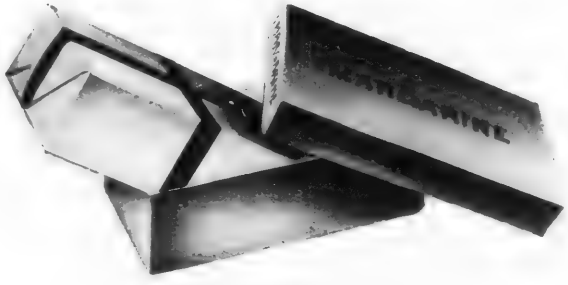


FIG. 9.

Automatically Packed Dairy Produce.

(With acknowledgments to Messrs. Kustner Bros. and Co., Ltd.)

The Packaging of Dairy Products

THE PACKAGING of all dairy products, not cheese alone, presents special difficulties, as the products are generally very liable to tainting and they offer a very appropriate medium for contamination by air-borne bacteria. The difficulty is usually solved by arranging for the packaging to be done by the automatic machines now available for this purpose.

The first two illustrations on the preceding page show a type of packing for cheese which is only feasible when automatic machines are employed for the process. A taut, double-crimped wrapping such as that shown, if produced by hand, would require so much handling as to lead to rapid deterioration of the product, so the modern method is for the cheese, after being processed, to be run while still hot and liquid into the tinfoil moulds and, as the wrappings are closed mechanically, the cheese comes out into the world sealed in a sterile container without having been touched by hand during the whole process. When unwrapped by the consumer the cheese is found in perfect condition, mould-free and with its flavour unimpaired.

It is due to the development of machinery for this purpose that crustless cheese has found such favour both at home and in hot climates. Whereas non-processed cheese is almost always in contact with the air and undergoing a gradual process of deterioration, a cheese wrapped in tinfoil retains its quality and condition indefinitely.

The actual packaging is done by one machine, which distributes a fixed quantity of cheese into the moulds, closes, and labels the package. The illustrations (Figs. 1 and 2) on the opposite page show the type of cheese-portion produced in two different styles of wrapping. Any shape, to fit practically every type or size of box or carton, can be wrapped.

Similar machinery has been developed for butter packing. One type of special machine for this purpose moulds any quality of butter into bricks of fixed weight, with considerable improvement, both from the hygienic and appearance standpoints, on previous methods.

The ice-cream industry, which has latterly developed a volume of trade quite unexpected in earlier years, is also catered for in the matter of automatic packaging machines, and the ice-cream sold in the familiar cups is now usually packed and capped by entirely automatic means.

Even the type of cheese known as "petite Suisse" presents no difficulty for the modern packaging machine, which prepares the cheese, rolls the tubes into which the cheese paste is run, fills them, and packs them in boxes ready for despatch.

In conjunction with the machines described above, others are used to attend to other details of the packaging work. Such machines label the boxes, seal cardboard cartons with tape, insert an opening string for cutting the tape when the box reaches the consumer, and make or assemble the cartons themselves. In fact, any type of product, solid, pasty, or liquid, can be handled by them automatically, with considerable improvements over older, hand-operated systems.

Dr. R. S. Williams

By the death of Dr. Robert Stenhouse Williams, there has been removed one to whom the principal credit for the development of dairy science is due.

The son of a Liverpool medical man, Dr. Williams was born in April, 1871, and received his medical training in his native city and in Edinburgh, where he qualified in 1896.

His early life was spent in teaching and research in Liverpool and district. For some years he was Lecturer in the University on public health bacteriology, and Assistant Superintendent of the Liverpool Institute of Comparative Pathology, in addition to holding several hospital appointments.

In 1912 Dr. Williams was appointed to the then newly established Dairy Research Institute at Reading, to which he devoted the remainder of his life. At that time the field of dairy research was, so far as this country was concerned, almost unexplored, and Dr. Williams realised that its thorough exploration would call for greater facilities, both in men and materials, than were then available. He worked continuously to develop an Institute which would be worthy of the milk and dairy industries, and under his direction the Institution attained a worldwide reputation.

Dr. Williams was also an active member of the Dairy Committee of the Royal Agricultural Society of England, and of the British Dairy Farmers' Association. He founded the Society of Agricultural Bacteriologists, and was also actively interested in many other societies associated with public health and dairying.

Chinese Wines

THE ordinary, stay-at-home person is astonished at the number and variety of Chinese wines. Professor Y. T. Chiu, of Lingnan University, in the first of a series of papers dealing with the analysis of Chinese foods and beverages (*Lingnan Science Journal*, p. 391, 1931), says these wines appear on the market in almost an infinite variety. Most of them result from the alcoholic fermentation of rice, but a few proceed from grapes and millet. The rice wines are really distilled liquors; they are sold as Liu Poon, Seung Ching (twice distilled), Sam Ching (distilled three times) and Sze Ching (distilled four times). Poorer people use the first two kinds. These rice wines are usually flavoured with oranges, pears, lichees, dates, pork, etc., which are previously soaked in either the Seung Ching or the Sam Ching, depending on the strength of wine desired. After soaking, the wine is filtered, sugar is sometimes added, and the wine is bottled.

Rice wine is also used to make the so-called medicinal wine which is supposed to possess the property of healing certain women's diseases and to strengthen those who are weak and pale. A certain kind of chicken with peculiar feathers from Hainan is soaked in the rice wine. This is drunk by many pregnant women in South China who hope to restore their health after child-birth by drinking this special kind of wine. Snakes, animals, ginseng, Chinese herbs, etc., are often soaked in rice wines in order to impart some curing property to the wine.

The special brands and names which appear in the Chinese market may be numbered among the hundreds. With such trade distinction it is not necessary to deal for the purpose of analysis. Based on essential difference in chemical composition these Chinese wines may be grouped into three divisions:

(*a*) Dry wines.
(*b*) Sweet wines.
(*c*) Medicinal wines.

A dry wine is one in which practically all the sugar has been changed into alcohol by fermentation. A sweet wine is one in which sufficient sugar remains in the finished product to give it a sweet taste, or in some cases cane sugar is added. Medicinal wines are dry wines which contain the medicinal ingredients dissolved in the alcohol. They are not intended for ordinary drinking, and are prescribed for patients by Chinese doctors.

Effect of *p*H on Corrosion of Tin

"THE Effect of Hydrogen-Ion Concentration on the Corrosion of Tin" is the title of a paper by J. M. Bryan, B.Sc. (Low Temperature Research Station, Cambridge), which was published in the *Transactions of the Faraday Society* for September, 1931. It will be remembered that the corrosion of tinplate by fruit acids was fully discussed in Food Investigation, Special Report, No. 40, 1931. There it was shown that the greatest corrosion losses are experienced with fruits of low acidity (*p*H 3·5 to *p*H 4·5). Mr. Bryan thought that a study of the factors which influence the corrosion of pure tin (especially the *p*H) might throw light on this fact. The expectation has not been realised; experiments showed that tin suffered most at high acidity. Evidently a large number of factors are involved in the corrosion of tinplate, such as the peculiar behaviour of tin and iron in couple and the presence of substances other than acids in the fruit juices or syrup.

The following is a summary of the results of Mr. Bryan's work:

1. Corrosion of tin is negligible in the absence of oxygen and within the range of hydrogen-ion concentration studied.

2. In the presence of oxygen, corrosion decreases with decreasing acidity from a hydrogen-ion concentration of *p*H 3·1 to *p*H 5·5; the slight increase which is observed from *p*H 2·4 to *p*H 3·1 is possibly due to the traces of iron, or other metals, which were present as impurities in the tin. Decreasing the acidity increases the tendency for oxidation of stannous tin to the stannic condition, although most of the tin in solution is in the stannic form throughout the whole *p*H range. A discrepancy exists between the volume of oxygen absorbed and that which is calculated from the oxygen-equivalent of the tin in solution. This discrepancy increases with decreasing hydrogen-ion concentration, and is due to oxidation of the citric acid and, possibly, the sodium citrate used as a buffer.

3. The addition of a small amount of ferrous citrate to the corroding solutions causes a marked acceleration in the corrosion of tin by air, over the whole *p*H range, especially at about *p*H 3, which is probably due to the catalytic action of the iron as an oxygen carrier.

4. Tin is readily attacked by a 0·5 per cent. solution of citric acid containing ferric citrate, in the absence of oxygen, and an almost linear relationship exists between the concentration of ferric iron and the metal dissolved. Decreasing the hydrogen-ion concentration retards the rate of attack initially, but the final corrosion is actually slightly greater at low than at high acidity. This is due to the fact that a decrease in acidity retards oxidation of the stannous tin in solution by the ferric salt; consequently, the efficiency of the available oxygen, as a corroding agent, increases correspondingly.

Piping Jellies

ON page 45 of the February, 1932, issue, in the recipes Nos. 1 and 2 for piping jellies prepared from fruit purée and pectin, the amounts given for pectin should be in ounces instead of pounds.

Fermentation of Honey

Considerable losses are incurred in the honey industries through the spoilage of honey on storage by fermentation. This applies particularly to the Canadian honey industry, and a detailed investigation has been made. It has been found (*Bull.* No. 116. New Series. Dept. of Agriculture) that the fermentation is caused by sugar tolerant yeasts, several types of which have been isolated and studied by the Division of Bacteriology of the Central Experimental Farm. Infection by these organisms may be due, in part, to careless handling and partly to the transportation by the bee of yeasts from the flowers to the comb.

In so far as the infection is caused by careless handling it can easily be avoided, but when it is due to the bees themselves it is impossible to devise any method of prevention. In this case, therefore, it is necessary to devise such control measures as will keep the activity of the yeasts at a minimum.

In order to get some insight into the conditions most favourable to the growth of yeasts in honey a fairly comprehensive investigation has been conducted in Canada by the Divisions of Bacteriology, Chemistry, and Agriculture. Two hundred samples of honey were collected from all parts of Canada. Each sample was divided into two parts, one of which was placed in a hermetically sealed receptacle and stored at room temperature, while the other half was examined chemically and bacteriologically. Careful examination of the analytical figures shows that the average moisture of the fermented samples is definitely higher than the average moisture of Canadian honeys. This substantiates the conclusion of a previous investigation—viz., that a high moisture content in honey is favourable to fermentation.

In the case of some of the other constituents, as, for example, nitrogen, titratable acidity, and ash, there is sufficient variation from the general average to suggest that they too might play a part in determining the optimum conditions for fermentation. Until the investigation is completed it is unwise to attempt to formulate any definite conclusions, but the results so far obtained give promise of a successful end to the research.

Rapid Moisture Testing

We have made frequent references to modern methods for the rapid determination of moisture in cereal products, seeds, and other granular substances, in particular the electrical methods which have been devised in recent years to give an almost instantaneous determination. Two electrical properties appear to be suitable as a basis for moisture content measurement—the dielectric constant and resistivity—as both these quantities vary with moisture content.

In order to keep our readers in touch with the latest work on the subject we would refer them to a paper by R. M. Davis, of University College, Aberystwith, read on February 5, 1932 (*Phys. Soc. Proc.*, vol. 44, Part 2, No. 242), which describes very important findings on the subject. The work was undertaken at the request of the Welsh Plant Breeding Station, part of whose activities consists of a large-scale production of pedigree grass and clover seeds, and since the keeping and germinating properties of seeds are largely dependent on their moisture content, many tests for moisture are necessary, and rapidity is essential.

An instrument is described in the paper for which the following advantages are claimed:

1. Simplicity of principle and construction.
2. The ease and rapidity of the moisture estimation, readings being obtained with a pointer.
3. The preliminary adjustment to reproduce calibration conditions is simple and not frequently required.
4. The permanency of calibration.
5. The sensitivity is adequate and can be varied to suit different conditions by varying the testing voltage, or alternatively by varying the sensitivity of the microammeter.

So satisfactory have been the results with seeds that it is proposed to extend the use of the instrument to the measurement of the moisture content of grasses and root crops; in the former case the grass will be cut up by passing it through a miniature chaff cutter; in the latter case it is proposed to use two insulated spikes inserted in the root as electrodes.

The Empire Fruit Industry

A lecture on the Empire Fruit Industry was given by W. G. Freeman, B.Sc., A.R.C.S., F.I.S. (of the Imperial Institute), at the Royal Society of Arts on February 23. He said that in 1931 the imports of fruit and fruit products were equal in value to those of butter, and exceeded the imports of wheat and flour by £12,000,000.

Physiological Milk: A Suggestion

(*Continued from page 72.*)

One final word, and this concerns the interpretation of the Milk and Dairies Acts, which prohibit the addition of water or any dried or condensed milk or any fluid reconstituted therefrom or any skimmed milk or separated milk to milk intended for sale, but it is most unlikely that the Ministry of Health would refuse a licence for a scientifically prepared and controlled product, which would be sold as "Physiological Milk," and which would supply a real demand and, at the same time, possibly supply a good excuse for the passing of another Act of Parliament, to be administered by the Minister of Health and his subordinates.

The Viscosity of Cream

MUCH DIFFICULTY is encountered by producers in preparing and marketing cream on account of variations in what is commonly referred to as "body." Consumers judge the quality of their cream supply mostly by its appearance; if the cream seems to be heavy and thick, this is assumed to indicate a high butter-fat content, and *vice-versâ*. Therefore it is to the best interest of the dairies to supply a uniform product and one with a good body.

C. J. Babcock, of the U.S. Bureau of Dairy Industry, has conducted experiments to determine some of the causes for the variations in body, and his work is reported in *Technical Bulletin No.* 249, July, 1931, U.S. Dept. of Agriculture. His conclusions are as follows:

There are a number of factors which may affect the viscosity of cream, but those which affect the fat phase are probably the more important, because any factor which affects the clumping of fat globules affects the viscosity of cream.

The viscosity of cream increases as the butter-fat content is increased. It also increases as the temperature is lowered.

The viscosity of cream is lowered by pasteurisation. The temperature of pasteurisation, however, has but little effect upon the viscosity. Pasteurised cream increases in viscosity with age, but not to so great an extent as does raw cream. The greatest increase in viscosity (in the case of either pasteurised or raw cream) takes place during the first 24 hours of ageing, and at 48 hours the maximum is approached. When the cream is homogenised there is practically no increase in viscosity, and when cream is both pasteurised and homogenised there is no increase in viscosity with age.

The increase in viscosity with age is accompanied by an increase in the amount of clumping of the fat globules.

The viscosity of gravity-separated cream is higher than that of centrifugally separated cream.

Standardising cream to a specific butter-fat content has practically no effect on its viscosity.

The freezing of cream lowers its viscosity. The viscosity of cream which has been frozen is not restored with age.

Acidity, unless in excess of 0·3 per cent., has but a slight effect on the viscosity of cream.

Raw or pasteurised cream that has been cooled slowly has a higher viscosity than raw or pasteurised cream that has been cooled rapidly.

The lower the separating temperature, the higher the viscosity of cream.

When the milk is held in storage before it is separated the viscosity of the cream is affected by the length of time in storage and the temperature during storage. When storage was at 4° C. the viscosity was increased more than when storage was at 18°. Storing the milk for 12 hours resulted in higher viscosity than storing for only 3 hours.

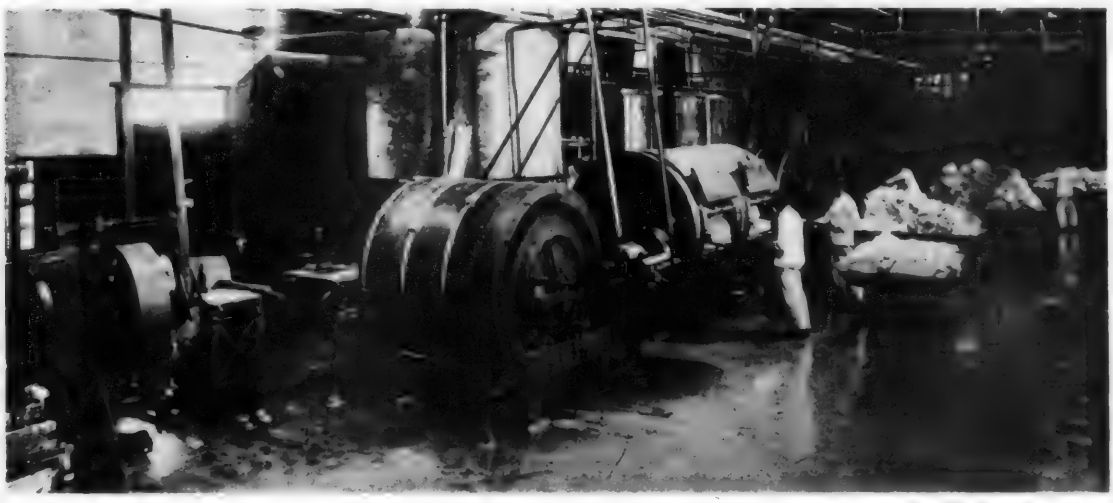
Cream from milk pasteurised before being separated has a lower viscosity than when the cream is separated and then pasteurised, unless the pasteurised milk is cooled slowly before being separated.

Homogenisation of cream increases its viscosity. The increase in viscosity is in direct relation to the homogenising pressure.

The increase in viscosity due to homogenising at a given pressure depends upon the temperature at which the cream is homogenised.

Rehomogenisation of cream lowers its viscosity.

The viscosity of cream increases as the percentage of solids-not-fat increases. This is true especially with homogenised cream.



Power-Driven Churn in a Dairy Factory.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers. **N.B.—Enquirers are requested to use the special form in the advertisement section.**

500. *We have been asked by some friends overseas to give them some information on the uses to which an over-production of milk could be put to. Butter and cheese are already being manufactured from the milk in sufficient quantities for the market, and they would like to have some suggestions for putting the surplus to some commercial use.* (London.)

It is, of course, impossible to give a definite reply to this in the absence of full particulars of all relevant matters. In a general way, one might suggest that consideration be given to the possibility of producing one or more of the following: milk powder, canned cream, whey powder, lactose, casein, lactalbumin, and butter-fat—*i.e.*, butter from which the salts and moisture have been removed, thus enabling it to be kept longer during transport and for subsequent use in the preparation of re-constituted cream. Then, again, there is the question of invalid and infant foods utilising as ingredients the products mentioned above.

Useful suggestions will be gleaned from other pages of the present issue.

501. *I have just come across in one of our local malthouses some wheat, soft Canterbury quality, which they are malting and using for bread manufacture. This is claimed by the millers to take the place of the hard wheat which we import from Canada and Australia, and if this is correct, then it will reduce our wheat importations very considerably, and increase the consumption of our locally grown article. I am wondering whether there has been much experimentation in England along these lines.* (New Zealand.)

What they are probably doing is to incorporate a certain amount of malted wheat into a grist to make a malted bread (like Turog or Bermalene). It therefore does replace a certain amount of hard wheat, but no one would dream of making bread from all malted wheat. As is well known, malt extract is employed to improve certain grists, but it behaves as a yeast stimulant rather than an improver in the usually accepted sense of the term, and merely enables the yeast to do its job properly and should only be used when the flour is definitely lacking in diastatic activity.

A patent was taken out by Dombach for the treatment of grain by germinating (U.S.P. 1030200, 1912) which you may find of interest, also papers by Sherwood and Bailey on Control of Diastatic Activity in Wheat Flour—(1) Production of diastatic flour and effect of large doses; (2) experiments with flour milled on a commercial scale (*Cereal Chemistry*, vol. 3, 1926, pp. 105-133 and 163-182)—which deal fully with this matter.

502. *Is banana flour a commercial proposition—for instance, in confectionery, biscuits, etc.? Do you know any reliable source from which it can be purchased on an economical basis?* (New Zealand.)

You will find in the new edition of *Food Industries Manual* (page 12) an article on banana flour to which we would refer you; also in the September, 1931, issue of FOOD MANUFACTURE. The Imperial Institute have also been interesting themselves in the product. At present the use of banana flour in confectionery is more common on the Continent than over here.

The enquirer was referred to certain firms able to supply the product.

503. *With regard to piping jellies, we have been experimenting with a formula which you published, but cannot produce as good an article as is turned out by some of the English makers. We have got it down to a clear jelly and it stands up fairly well, but the trouble is to get the clarity and yet the stiffness.* (New Zealand.)

We would suggest you try the recipes given in the February issue of this journal, at the same time taking care, in the case of the piping jelly prepared from pectin, to read the amounts given for pectin as ozs. and not lbs.—viz., 6¾ ozs. and 6 ozs. respectively.

504. *Required a pickle for meats used in the manufacture of brawns and similar cooked meats. The pickle should ensure that, when cooked, the jelly will keep and yet will not make the brawns too salt to the taste.* (Glasgow.)

You should not rely too much on excessive curing for keeping your brawns, etc. A lot will depend on the cleanliness of conditions. At the same time it is necessary to have thorough curing. A good strength cure is, at this time of the year, 2 lbs. salt to a gallon of water. It is essential that the pickle should be as cold as possible during cure. The meats should be thoroughly submerged during pickling; also, the vessel containing the pickle and meats should be as clean as possible and frequently washed out. Furthermore, wooden tubs or barrels for cleanliness' sake should not be used, but slate or concrete tanks.

Moreover, the same pickle should not be used too often, and before the meats are cooked well they should be washed free of pickle. When the meats are cooked finally—that is, just before they are placed into open earthenware bowls—they should be well cooked, containing all the ingredients that will be added or have been added at any time.

With regard to your statement that if the meat is all cured the cooked product is too salt, a lot will depend on the temperature of your curing brines, which for efficient results should not be above 40 to 44° F. At the same time, the meats should not be left in pickle too long.

Also, it is quite possible to add to the cured material a small proportion of fresh, cleanly washed, unpickled material which contains no salt, and therefore will help to reduce the high salt content of the pickled meat.

505. *We shall be glad to know of a recipe for chicken soup and something about the process of manufacture. What head space should be left in a 2⅝×4-in. can?* (Lanarkshire.)

These soups are the result of individual tastes. You will find that chicken soup is made up on widely varying formulæ; there is, therefore, not much use in our giving you definite formulæ.

The essence of chicken soup manufacture, however, is to save the liquors in which the chickens are cooked, and, furthermore, to cook in these liquors at a later period the giblets and bones, etc., removed from the chickens when the flesh is used for other purposes.

Sometimes small pieces of vegetables are added. The usual flavourings are salt and pepper. After the soup is prepared ready for canning it is filled hot into the tins. The best head space would be $\frac{3}{16}$ to $\frac{4}{16}$ of an inch, so that on opening the cans show about $\frac{2}{16}$ to $\frac{6}{16}$ head space. When filled the cans are then retorted, and we would suggest retorting them at 40° F. for fifty to sixty minutes.

506. *We should be obliged if you will put us in touch with the makers of a power-driven bread-crumbling machine.* (London.)

This was done.

507. *With reference to enquiries Nos. 428 and 439, we should be interested to receive names and addresses of the*

firms making machines for removing stones from dates. (Birmingham.)

These were furnished.

508. *We observe that under enquiry No. 305 you have given one of your subscribers the names of manufacturers of machines for making beef cubes. We should be glad to have these.*

Also we should be obliged if you will put us in touch with the makers of small hand-driven machines for removing stones from dates. (India.)

The information required was supplied.

509. *In your February, 1932, issue you illustrate on page 37 the Utilicon Moulded Seamless Bottle Container. We should be greatly obliged if you would be kind enough to advise us of the name of the manufacturers of these containers.* (Hull.)

This is Messrs. Universal Seamless Containers, Ltd.

510. *Kindly send us the maker's name of the "Never-stop" filling machine.* (London.)

This was done.

511. *Names of firms required who can supply complete plant making potato crisps.* (Scotland.)

512. *We believe that vendors of meat and bone meal for poultry and animals are bound to furnish purchasers with analyses, etc. Where can we obtain particulars of any laws or regulations in this connection?* (Ayr.)

You should obtain a copy of the Fertilisers and Feeding Stuffs Act, 1926, and the Fertilisers and Feeding Stuffs Regulations, 1928, which have been drawn up and introduced to regulate the sale of fertilisers and feeding stuffs in Great Britain and Northern Ireland. It is stated in section 2, paragraph (4), that any statement as to the amount of nutritive or other ingredients of any article sold for use as a food for cattle or poultry, in any written document descriptive of the article, shall have effect as a warranty by the seller that the facts stated are correct. Also in section 2, paragraph (5), it is stated the warranty as to percentages of ingredients shall only come into effect where the limits of variation, stated in the regulations, are exceeded.

The Act and Regulations are quoted in a book by A. S. Carlos, entitled *Feeding Stuffs* (1928), which is a very useful little book on the subject.

513. *We wish to get in touch with an expert who would be prepared to work out a series of recipes for artificial creams for confectioners' use.* (London.)

A suitable recommendation was made.

514. *We wish to be put in touch with firms able to supply individual moisture-proof packets which preserve eggs for a considerable time. We understand that the mouth of the packet is twisted, making it an effective seal and preventing evaporation.* (London.)

Names of firms furnished.

515. *We shall feel obliged if you can put us in touch with direct importers of Canadian honey in bulk, for repacking.* (Gloucestershire.)

Suggestions were made.

516. *We wish to make an enquiry concerning the manufacture of orange juice and lemonade cordials, and will be obliged if you can refer us to information concerning manufacture, plant, etc.* (Newcastle.)

We have at various times in the past quoted from some of the bulletins dealing with this subject which have been issued by Professor Cruess and his staff at the Fruit Products Laboratory, Berkeley, California University, where for a number of years investigations have been carried out. Probably the most complete and up-to-date information can be obtained from this source, and we would suggest you write to Professor Cruess. There are one or two books which touch on the subject, as, for instance, Dr. Wiley's *Beverages and their Adulteration*. In this country much useful information may be obtained from the booklets on beverages, cordials, liqueurs, etc., issued by W. J. Bush and Co., A. Boake, Roberts and Co., Ltd., and Messrs. Stevenson and Howell.

A list of manufacturers of plant was furnished.

517. *Required, the address of the Tonicon Co., Ltd., the proprietors of the "Tonicon" brand for preparations of malt for use as a food or for making beverages.* (Holland.)

518. *We should be extremely obliged if you could inform us of any firm in this country who undertake the supply of equipment for fish canning.* (Hull.)

Names and addresses furnished.

519. *Required, the name and address of the manufacturers of a direct drive electric motor and meat mincer known as the "Advance" and "National."* (London.)

520. *I wish to be put in touch with European firms who would purchase Jamaica coffee, pimento, cocoa, and copra. I also wish to extend my import business in food agencies suitable for this island. Information also required on dry ice and also ingredients for making a local gin and sherry wine. Probably I could sell here a New Zealand milk powder.* (Jamaica.)

The enquirer was furnished with names of firms supplying dry ice and with likely sources of information concerning the other points he raises. As regards dry ice, unless there is a considerable amount of carbon dioxide gas available in Jamaica it will not be possible to make the solid product; moreover, the plant is rather expensive.

521. *We desire to be put in touch with the manufacturer of a machine which could grind date stones into a powder. The machine would have to be of sturdy construction.* (London.)

This was done.

522. *Information required on the canning of sardines.* (Bristol.)

An outline of the processing scheme was supplied to the enquirer. Further information may be obtained from Cobb's book on the *Canning of Fish Products*, the various reports issued by the U.S. Dept. of Commerce, the book entitled *A Complete Course in Canning*, the Ministry of Agriculture and Fisheries' Report (1921) on the Methods of Fish Canning in England, and back numbers of FOOD MANUFACTURE, such as the November, 1931, issue.

523. *Information required on the canning of fish.* (Germany.)

The remarks made in connection with Enquiry No. 522 apply here also. The enquirer was referred to the Institut für Seefischerei, Wesermünde, Germany, where Dr. Lücke has been investigating fish canning problems for a number of years.

524. *Can you furnish me with the names of British canners of chicken?* (Wirral.)

This was done.

525. *Required, information on plant used for making of corn flakes.* (Derby.)

As previously remarked, this involves steaming, rolling, drying, and possibly toasting plant. The enquirer was referred to suppliers of these machines. An article on this subject is to be published in FOOD MANUFACTURE.

526. *Kindly supply recipes for sweet pickle, thick sauce, and piccalilli.* (Glasgow.)

There are innumerable recipes for these. It is best to work them out for oneself from representative recipes serving as a base.

Examples of recipes were furnished.

527. *We should be greatly obliged to have the names of firms able to supply the necessary plant and equipment for the processing and canning of meat.* (London.)

These names were given.

528. *Information required on the use of boracic acid in preserves.* (London.)

Those parts of the Public Health (Preservatives in Food, etc.) Regulations, 1925, bearing on the matter were quoted.

520. *We wish to obtain a small, simple machine for labelling jars.* (Derbyshire.)

Suggestions as to firms supplying this were made.

530. *Kindly supply a recipe for making and applying a white flour glaze to meats and pastes.* (Stranraer.)

The enquirer was referred to the recipes previously published in this journal.

531. *Required, gummed gold paper seals for closing transparent paper bags containing freshly roasted coffee and other dry goods. Also recipes for salad cream and mayonnaise.* (Nairobi.)

Various makers were requested to send samples of labels to the enquirer. Recipes were supplied as requested.

532. *We should be obliged if you could give us the names of British firms who make machinery for rolling on the ends of sanitary cans unfilled.* (Edinburgh.)

Suitable firms were recommended.

533. *I shall be obliged if you will let me know the name and address of the manufacturers of "Elpex" apple pectin; also other manufacturers of pectin.* (London.)

This information was supplied.

534. *Please inform us of any firms manufacturing drinking straws, both paper and naturally grown.* (London.)

This was done.

535. *We venture to enquire if you could put us in touch with makers of machines suitable for packing yeast in 1 lb., ¼ lb., and 2 oz. packets, wrapped in aluminium foil.* (Yorkshire.)

This was done.

536. *We should like to get into touch with any concern in England which packs salt beef, fatback pork for cooking, snouts, tails, ribs, heads, picnic hams, dry sausage, etc.* (Trinidad.)

537. *We should be interested to learn of a machine for exhausting and sealing tins for baked cakes for export to the tropics.* (London.)

Suitable recommendations were made.

538. *Would a gum used for making transparent bags for packing fillets of fish have any deleterious effect?* (London.)

We cannot answer this question until we have some idea of the nature of the gum. However, in general terms, one will be safe in stating that since fish is more susceptible to becoming tainted by objectionable odours and other deleterious substances, such as preservatives, which might happen to be in the gum, greater care would have to be taken than with ordinary foodstuffs, such as, say, cereal products.

539. *Could you favour me with a recipe for gravy salt?* (London.)

The enquirer was referred to an article on this subject published in the May, 1931, issue of FOOD MANUFACTURE.

540. *Kindly supply names of a few engineering firms that specialise on plant for canning fruit and vegetables.* (Manchester.)

This was done.

541. *We should be glad to know if any of your subscribers manufacture a soluble starch or similar preparation suitable for use in piping jellies.* (Glasgow.)

The enquirer was referred to firms supplying pectin. Possibly Gelozone would serve the same purpose.

542. *Kindly give us names of firms making cans and sealing machines for use in packing soups.* (Lanarkshire.)

This information was furnished.

543. *Extract of prawn waste, prepared in the ordinary way, has an offensive odour due to the presence of "excretement." How can this be removed without losing the valuable nutritive substances?* (Norway.)

This should be possible by washing the prawns in warm brine with slight agitation. They must be either cooled when they leave the bath or cooked immediately.

544. *Could you inform us where we can obtain samples of whey and milk powder?* (London.)

This information was supplied.

545. *Please give us the names of a few makers of paper similar to the accompanying sample.* (Wales.)

Suggestions were made.

546. *Kindly refer us to firms in this country able to supply plant for canning sardines—apart from can-making and closing machines.* (Worcestershire.)

This was done.

547. *What is the cause of fat separation in lemon curd after baking?* (N. England.)

It is difficult to say what is the trouble unless we know the mixing used and how it is made up. The matter was discussed in the course of correspondence.

548. *Information required on the methods adopted for drying vegetables.* (Midlands.)

We think the best plan is to put your requirements before a firm of drying engineers. It would be necessary for them to have full particulars of the nature of the material to be dried and the quantities, from which they could design a plant the right size and construction to meet your requirements.

It is necessary to prepare the vegetables in a proper manner, and then it is usual to spread these out on trays which are arranged in a tunnel or compartment form of dryer through which air heated to correct temperature is blown by a fan.

A. W. Knapp did a lot of work on drying of vegetables (see his report in the *Journal of the Society of Chemical Industry*, May 7, 1926, pp. 123-128) at request of War Contracts Department. A vegetable drying factory was erected at Bournville and at Badsey, Evesham.

549. *In the October number of your journal I came across reference to the erection of two factories in Canada for the manufacture of Swansdown cake flour. Apparently this flour is made from soft wheat, and, as our district here grows nine-tenths of the soft wheat used in New Zealand, I was just wondering whether you could give me any information regarding it, and whether the product is worth while investigating with a view to its manufacture in New Zealand.*

In this country we import a certain amount of hard flour from Australia and Canada to blend with the local soft flour for general baking, bread, biscuits, cakes, etc., but if there is a new process of utilising soft wheat for cakes and pastry, I should very much like to learn something more about it. (New Zealand.)

Swansdown to which you refer is made by Messrs. Ingleheart Bros., Inc., U.S.A. It is made from soft winter wheat—specially selected for its tender, delicate gluten. It is a very short patent flour, only 26 per cent. of flour being used. It is ground extremely fine, and those samples examined are much finer than ordinary flour. It is matured and bleached with betchelor gas. No doubt New Zealand wheat could be used to produce a flour similar to Swansdown if the aforementioned points are borne in mind. It should be remembered that Swansdown commands a very high price—6d. per lb.—and is essentially a luxury product.

550. *We should be glad to have particulars of the best machine for drying sliced bread without discolouring it or reducing it to powder.* (Cumberland.)

One firm makes a special plant for the purpose. If this is too large for your requirements, any competent firm of drying engineers would be able to submit a design. Warm air controlled as to temperature and humidity is circulated by a fan blowing the air over steam pipes. A suitable valve arrangement will enable the correct proportion to be recirculated. The bread could descend by gravity or be conveyed through the dryer on wire belts or cages. Care should be taken to ensure against contamination and mould infection; the temperature should be high enough to effect sterilisation.

Trade Notes

Useful Booklets.

We have received two extremely useful small publications from Messrs. A. Boake, Roberts and Co., Ltd. One is entitled *A Handbook for Ice-Cream Makers,* which has contrived to squeeze into its sixty-seven pages a wealth of practical information essential to the successful manufacture of ice-cream. The numerous matters dealt with are grouped into the following chapters: (1) The Factory and its Equipment; (2) Materials; (3) The Mix; (4) The Preparation of the Mix; (5) The Flavouring of the Mix; (6) The Freezing of the Mix; (7) Storing and Hardening; (8) Common Defects in Ice-Cream; (9) Standardising the Mix; (10) Dry Ice; (11) Recipes for Sundaes, etc.; (12) Reconstituted Mixes.

The other booklet is entitled *Fruit Wines and Cordials,* and contains a selection of formulæ for these, together with instructions for their preparation.

* * *

The "Chorlton" Patent Vacuum Seaming Machine.

We desire to correct any possible misconception which may have been gained by our reference on pages 37 and 38 of the February issue to the vacuum sealing machine. On page 38 we stated that the vacuum seaming machine there described had been introduced by Messrs. C. and E. Douglas and Co., Ltd. We are informed by Mr. Charles E. Douglas, the managing director, that this is wrong. The correct designation is the "Chorlton" Patent Vacuum Seaming Machine, after the designer and inventor.

* * *

Projected New Russian Cannery.

The construction of a very large cannery at Kherson, in the Ukraine, with a capacity of 100 million cans a year, has been decided upon, writes a correspondent. The construction of this factory has been included on the list of the most important construction projects, and the work is expected to be completed in time for the canning season this year. An area of 1,500 hectares of garden land has been assigned to the cannery for use as a source for the requisite raw materials.

* * *

Publications Received.

Properties and Uses of Malleable Nickel; Pure Nickel in Food Manufacturing Equipment; Cooking Utensils in Malleable Nickel. Issued by Messrs. Henry Wiggin and Co., Ltd., describing the various industrial applications of nickel. For the food industry, nickel is valuable because of its high tensile strength, toughness, resistance to corrosion, and non-toxicity. Numerous examples of plant fabricated in nickel for jam boiling, cooking, filtering, and distillation, etc., are illustrated and described.

Handling Fibre-Board Cases. Issued by the Export Fibre-Board Case Association. The correct methods of stacking, slinging, and stowing fibre-board cases are described. When being handled by derricks or cranes care should be taken to see that the rope slings do not come in direct contact with the cases. In warehouses or ships' holds the boxes should be stowed on even, flat floors, and the interlocking style of packing is recommended.

Plant Summary, List A. Issued by Messrs. Oliver Ashworth and Co. An illustrated list of new and second-hand plant for disposal, including filter presses, water softeners, refrigerating plant, mixing pans, vats, dryers, weighing machines, air conditioning equipment, etc.

* * *

Sidac Cellulose Paper.

Messrs. W. S. Muir and Co., Ltd., inform us that Mr. J. M. Hannah, formerly a director of the concern, has severed his connection with Messrs. Muir and Co., Ltd., further to develop the sales of "Sidac" transparent waterproof cellulose paper in this country as the Sidac Silverine Company, 83, Upper Thames Street, E.C.4. Mr. Stepan (Mr. Hannah's former co-director) now assumes sole control of the firm of W. S. Muir and Co., Ltd., which will continue to supply all its former specialities with the exception of the Sidac cellulose transparencies referred to above.

* * *

The 1932 Canners' Exhibition.

The 1932 Canners' and Allied Trades' Exhibition will be held in conjunction with the Imperial Fruit Show at Bingley Hall, Birmingham, from October 21 to October 29 next.

* * *

The Bakers' and Confectioners' Exhibition.

Members of the trade will be interested to learn that the thirty-sixth Bakers' and Confectioners' Exhibition and Market is to be held this year from September 3 to 9, as usual, at the Royal Agricultural Hall, London.

* * *

Australian Rabbit Meat Industry.

It is interesting to observe how Australia is converting a former nuisance into a profitable industry. During the first four months of the present Australian fiscal year (April to July inclusive), there were exported from that country rabbits and hares to the total value of £244,313 sterling and also more than 4½ million lbs. of rabbit and hare skins worth £356,378 sterling. For the preceding fiscal year, ending March 31, 1931, the total exports were 413,584 crates of rabbits and hares and 7,141,550 lbs. of rabbit and hare skins, which makes a very favourable comparison for the first four months of the present fiscal year, according to local reports.

Shipments are made continuously throughout the year except during the latter part of August and the first two weeks in November. Exports have gone to Canada, United Kingdom, and the Far East. An interesting development has been the preparation of rabbit cutlets, in which a firm in Victoria is now specialising. One firm has put on the market a 7-lb. carton of rabbit cutlets, and also a line of boned rabbit in 14-lb. packages. It is reported that these specialities have been very well received abroad.

* * *

Australian Canned Fruit Industry.

The Leeton State Cannery at New South Wales opened about the middle of December for the apricot season. The quantity of fruit at Sydney to be treated has been limited to 896 short tons. Owing to the toll of frost and thrip, the peach pack is likely to be very light, in fact only about 25 per cent. of normal. The delivery to the cannery, it is estimated, will not exceed 560 to 672 tons.

In the report issued at the beginning of December by the Victorian Department of Agriculture, it is stated that canning varieties of peaches are carrying a better crop than was estimated earlier. However, the official estimate of the coming season's crop in Victoria indicates the damage done by the severe visitation of thrips during the spring. Comparisons with last year are as follow:

	Bushels.	
	1930-31.	1931-32.
Pears ...	707,145	750,000
Peaches ...	1,028,493	500,000
Apricots ...	305,717	369,000

Of the pear crop, the report states, there will probably be a normal crop of the canning varieties Williams Bon Chretien (Bartlett).

Although the pack of canned apricots and pears will be about normal in Victoria, the peach pack will be very light.

A report issued by the Chief Horticultural Instructor in South Australia indicates that there will be a good average crop of pears, the total yield approximating 175,000 cases. On the whole, the yield of apricots is expected to be below normal, not exceeding 200,000 bushels. The report states that the production of peaches is declining in South Australia, owing to lack of

By courtesy of] *[Siemens, E.L.S., Ltd.*

Flood Lighting a Modern Factory.

markets for the drying and canning varieties. All districts report from poor to fair settings, and the aggregate will be less than an average of the past five years, probably reaching 100,000 bushels.

* * *

The L.C. Automatic Retort.

An automatic pressure retort of the type described on p. 331 of our November, 1931, issue was demonstrated under full mechanical operation by the makers, L.C. Engineering Supplies, Ltd., at their works last month. The principal features claimed for this machine, it will be remembered, are continuous operation, easy regulation, and absolute uniformity of processing times, and completely automatic action, including the loading and ejection of the cans. The demonstration retort was examined by representatives of many of the leading firms in the canning industry, and it is shortly to be installed at a well-known pea cannery, where it will probably be open for inspection.

* * *

Hawaiian Pineapple Pack.

The following information has been received from the Honolulu Chamber of Commerce: "Pineapple crop excellent but size next pack will be governed by relative volume of distribution of carryover. Some canners staging short weekly runs to fill grades and sizes which are short. Pineapple shipment in steady volume. Industry in as good shape as any other line of canned foods."

* * *

Canned and Dried Fruit Market in New Zealand.

Present indications are that there will be a shortage of canned fruit in the Dominion, according to information received from Wellington, New Zealand. The Australian packers have made very heavy sales to London, due to Californian shippers being handicapped through the dollar exchange. Some packers have sold up to the limit of their packing capacity, and simply cannot quote for New Zealand demands.

Reports indicate that there will be no prunes available for export from Australia this year owing to the crop having been damaged. In view of this fact, increased quantities will be imported from California this season, and owing to the present position in this market, costs are likely to be higher.

* * *

New Regulations on Tomato Extract in Argentina.

A decree is now in force in Argentina which in substance provides that the designation "Concentrate or extract of tomato" can only be used where the respective product contains a minimum of 16 per cent. of dry extract free from sodium chloride, while the designation of "Double concentrate or extract of tomato" requires a minimum of 28 per cent. of dry extract free from sodium chloride, and the distinction "Triple concentrate or extract of tomato" can only be used in cases where the product contains a minimum of 36 per cent. of dry extract free from sodium chloride.

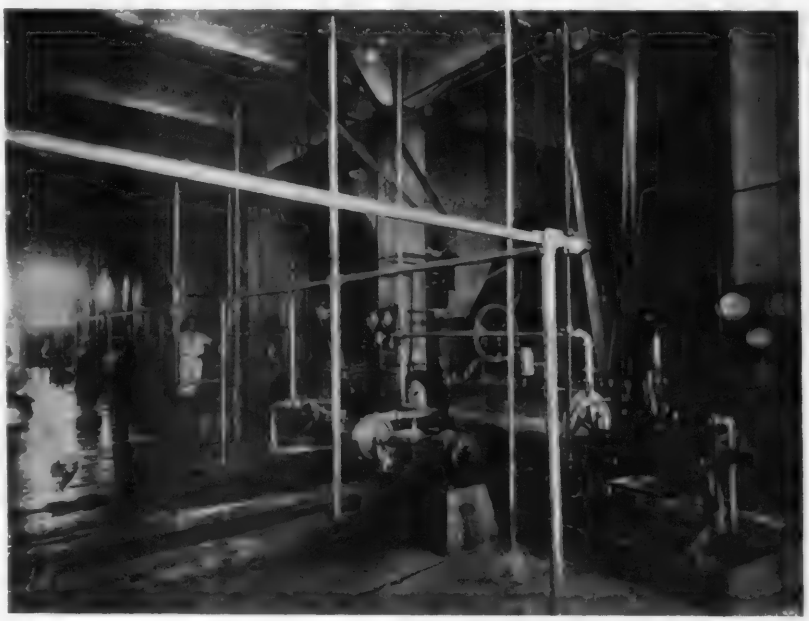
This decree is of some importance due to the fact that there has been a great variation in the amount of dry extract contained in various brands of tomato paste, and also large quantities of this product have been imported in bulk and canned locally with considerable quantities of liquid added to thin it down. Of the approximately 33,000,000 lbs. of tomato extract imported into the Argentine during 1930, Italy supplied by far the greatest amount, with Spain second and Chile third, whereas the United States supplied about 165,300 lbs.

* * *

Japanese Canned Crab Pack.

The total pack of canned crab for the past season is reported as 320,000 cases, according to figures furnished from Tokyo. This figure is some 15,000 cases in excess of the total pack authorised by the Government at the opening of the season, but, as it shows a great reduction from the pack of 585,000 cases during the 1930 season, the production curtailment plan is considered a great success.

Stocks of canned crab on hand on November 10 totalled 300,000 cases. All of this is new stock, the carry over from the previous season having been disposed of. Packers and exporters are said to be greatly pleased with the condition of stocks, since for the past several years heavy carry overs have caused difficulties in marketing.



Interior of a Dried Milk Factory.

(By courtesy of the High Commissioner for New Zealand.)

Financial News

(SPECIALLY COMPILED BY S. HOWARD WITHEY, S.F.INT.A.C., F.C.I., ETC.)

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section.

The deflation of agricultural values in Argentina is reflected in the accounts submitted by **Agar, Cross and Co., Ltd.,** covering the year to June 30 last, the result being a loss of no less than £235,986 as compared with a profit of £120,495 realised during the preceding twelve months. This unsatisfactory state of affairs necessitated the transfer of £280,000 from reserve, and with £26,531 brought in from the 1929-1930 account there was an available balance of £70,545, enabling the full year's dividend on the two classes of preferred shares to be met. This company of export merchants was registered in 1908, and the entire authorised share capital of £1,550,000 has been issued and paid up in the form of £1 shares, of which £300,000 are 7 per cent. cumulative preferred, £350,000 8 per cent. second cumulative preferred, and £900,000 ordinary shares. A summary of the 1930-1931 account is given below :

	£	£
Brought forward from 1929-1930 ...	26,531	
Transferred from Reserve	280,000	
	£306,531	
Loss—year ended June 30, 1931 ...	235,986	
Disposable Balance	£70,545	
Debenture and Share Issue Expenses written off		6,733
7% dividend on £300,000 Cumulative Preferred £1 Shares		21,000
8% dividend on £350,000 Cumulative 2nd Preferred £1 Shares		28,000
Carried forward to 1931-1932		14,812
		£70,545

Some of the principal balance sheet items are the following :

	June 30, 1931. £
Goodwill	300,000
Property, Furniture, etc.	847,505
Subsidiaries	41,588
Stocks	2,631,971
Debtors	1,034,359
Cash	114,853
Creditors	1,583,347
Bank Advances	315,509
5½% Debenture Stock	656,850

At 96 the debenture stock yields 5·72 per cent., while at the recent price of 18s. the second preference shares return 8·88 per cent. The first preference shares are marked at par, and the ordinary shares were recently quoted at 15s. 9d.

Incorporated thirty-nine years ago under the laws of Natal, and carrying on the business of tea and sugar planters and manufacturers, **Sir J. L. Hulett and Sons, Ltd.,** has an authorised share capital of £1,050,000, the amount having been increased from £900,000 three years ago by the creation of £150,000 ordinary shares. The final accounts are made up to April 30 each year, and are usually submitted in Durban in October, and, although the output of manufactured sugar increased during 1930-1931, the prices realised were the lowest in the company's history, and this fact, together with a higher depreciation charge, has caused the directors to reduce the ordinary dividend from 6 per cent. to 2½ per cent., a decision which is undoubtedly wise in view of the prevailing uncertainty. The balance of net profit for the year amounted to £59,652, which figure compares with £45,921 realised during the preceding twelve months, and, subject to directors' and auditors' fees, the sum of £35,616 is carried forward against £16,824 brought in. The principal balance sheet items are enumerated below :

	April 30, 1931. £
Fixed Assets	1,065,062
Debtors	144,680
Stores	49,610
Stocks	27,596
Growing Crops	81,210
Investments	333,558
Creditors	212,035
Due to Bankers	27,799
General Reserve	200,000
7% Registered Notes	250,000
7½% Cumulative Preference Shares	225,000
Ordinary Shares	750,000

At the recent price of 13s. the ordinary shares yield 3·84 per cent.

The profit of £11,687 realised by **Honywood Hotels, Ltd.,** during the year to April 30 last compares with a net profit of £14,527 shown in the previous account, necessitating the passing of the ordinary dividend, which for 1929-1930 was at the rate of 6 per cent. The company was registered in 1924 and controls several hotels, the entire authorised share capital of £250,000 having been issued and paid up in the form of £200,000 8 per cent. cumulative preference shares of £1 each and £50,000 in ordinary shares of 2s. 6d. denomination. The 1930-1931 appropriation figures are given below :

	£	£
Brought forward from 1929-1930 ...	5,704	
Net Profit—year ended April 30, 1931 ...	11,687	
Disposable Balance	£17,391	
8% dividend on £200,000 Cumulative Preference £1 Shares	16,000	
Less Tax at 4s. 6d. in the £	3,600	12,400
Carried forward to 1931-1932		4,991
		£17,391

The cash balance at the close of the company's financial year amounted to £11,733.

Messrs. D. Jones, Dickenson and Co., Ltd., report an increase in the margin of net profit for the twelve months which terminated on September 27 last, the figure being £1,543 as compared with £688 shown in the previous account. After adding £184 brought in from 1929-1930, there was an available balance of £1,727, which enabled a dividend of 3 per cent. to be paid on the 6 per cent. preference shares and the sum of £527 to be carried forward. This company was registered in 1895, and the share capital ranking for dividend consists of £40,000 in preference shares and £80,000 in ordinary shares, all of £1 each. The results of the past year are given below :

	£	£
Brought forward from 1929-1930	184	
Net Profit—year ended September 27, 1931	1,543	
Disposable Balance	£1,727	
3% dividend on £40,000 6% Cumulative Preference £1 Shares		1,200
Carried forward to 1931-1932		527
		£1,727

The company holds the entire share capital of **Ledbury Preserves (1928), Ltd.**

Current Literature

Correlation Studies of the Growth of Apple and Cherry Trees in the Nursery from the Seedling to the Two-Year Budded Tree. By H. B. Tukey and Karl Brase. Tech. Bull. No. 185. October, 1931. New York State Agricultural Experiment Station.

The Rate of Chemical Charge in Milk brought about by certain Lactic Acid Streptococci. By C. D. Kelly. Tech. Bull. No. 184. October, 1931. *Ibid.*

Variable Seed Treatment with Special Reference to the Use of Hot Water and Organic Mercurials. By E. E. Clayton. Tech. Bull. No. 183. August, 1931. *Ibid.*

Variation in the Lima Bean as Illustrated by its Synonymy. By G. P. Van Eseltine. Tech. Bull. No. 182. July, 1931. *Ibid.*

Some Effects of Legumes in Relation to Economical Crop Production. By R. C. Collison. Bull. No. 596. August, 1931. *Ibid.*

A Simple Chemical Test for Predetermining the Culinary Quality of Potatoes as Affected by the Accumulation of Soluble Sugars. By W. M. Peacock. Circular No. 158. March, 1931. U.S. Dept. Agriculture.

The Outlook for the Dairy Industry and some Essentials of a National Dairy Programme. Prepared by the Staff of the Bureau of Agricultural Economics. Miscellaneous Publication No. 124. August, 1931. *Ibid.*

Insecticides, Equipment and Methods for Controlling Orchard Insect Pests. By A. L. Quaintance. Farmers' Bulletin No. 1666. September, 1931. *Ibid.*

Spectrographic Analysis of Marine Products. By J. M. Newell and E. V. McCollum. Investigational Rept. No. 5. July, 1931. U.S. Dept. of Commerce, Bureau of Fisheries.

Market for Marine Animal Oils in the United States. By R. W. Harrison. Investigational Rept. No. 7. April, 1931. *Ibid.*

Effects of Pulp Mill Pollution on Oysters. By Hopkins, Galtsoff, and McMillin. Bulletin No. 6. March, 1931. *Ibid.*

Alaska Fishery and Fur-Seal Industries in 1930. By W. T. Bower. *Ibid.*

Studies on the Oyster Drill. By. H. Federighi. Bulletin No. 4. January, 1931. *Ibid.*

Some Factors Affecting the Replacement of the Commercial Fresh-water Mussels. By M. M. Ellis. Fishery Circular No. 7. December, 1931. *Ibid.*

Ice-Cream Brick Moulds and Cartons. Simplified Practice Recommendation R 120-31. U.S. Dept. of Commerce, Bureau of Standards.

Physico-chemical Properties of Edible Canna and Potato Starches. By J. C. Ripperton. Bulletin No. 63. October, 1931. Hawaii Agricultural Experiment Station, Honolulu.

(1) *Malayan Pineapples,* (2) 50 *Recipes for Dishes made from Malayan (Singapore) Tinned Pineapples.* Compiled by C. H. Senn. Issued by the Malayan Information Agency, London.

Private Companies. By H. W. Jordan. 15th edition. 66 pp. 1932. Jordan and Sons, Ltd., London. 2s. net.

This is a new edition of Jordan's well-known publication concisely stating the privileges and exemptions enjoyed by private companies. Contents: Introduction of the Joint-Stock System. Utility of Private Companies. Exemptions Enjoyed by Private Companies. Restrictions Imposed on Private Companies. Directors. Conversion of Private into Public Company. Procedure after Incorporation. Documents to be Filed. Uncommon Registrations. Duties and Fees Payable on Incorporation.

Converting a Business into a Private Company. By H. W. Jordan. 9th edition. 50 pp. 1931. Jordan and Sons, Ltd., London. 1s. 6d. net.

A small handbook giving concise instructions on the procedure involved, cost of formation, drawing up of memorandum and articles of association, transfer of business to company, documents required, obtaining additional capital, duties and fees.

Chemistry at the Centenary (1931) *Meeting of the British Association for the Advancement of Science.* A full report of the meetings held in September, 1931. 272 pp. 1932. W. Heffer and Sons, Ltd. 7s. 6d. net.

This volume is the only complete record of the proceedings of the Chemistry Section of the British Association at its Centenary Meeting last September. It constitutes an important record of the latest advances in the rapidly expanding fields of bio-chemistry and physical chemistry, and will be welcomed by all workers in these branches of science. The various papers and contributions to discussions have been grouped under the following heads:

1. Sir Harold Hartley's presidential address on "Michael Faraday and the Theory of Electrolytic Conduction."
2. The discussion on the Influence of the Medium on the Properties of Electrolytes.
3. The discussion on the Chemistry of the Vitamins and Related Substances.
4. The symposium on the British Fuel Problem.
5. The discussion on the Structure of Simple Molecules.
6. An account of the exhibits and the excursion to the Gas Light and Coke Company.

An Introduction to Organic Chemistry. By John Read, M.A., Ph.D., B.Sc. Pp. 365. Bell, London. 1931. 6s. 6d.

This book can be recommended to those who wish to gain an elementary, yet comprehensive, acquaintance with organic chemistry. It is a great improvement on the older and still common manner of presenting the vast assortment of chemical data to the beginner, in that it stresses general principles rather than overloading the memory with hosts of facts. It will be found well up to date as regards both theory and commercial processes. There is an atmosphere of the works and man's everyday activities about this book rather than that of the university study.

Beef Grading and Stamping Service. By W. C. Davis. United States Department of Agriculture Leaflet No. 67. Issued September, 1930.

Since 1915 the Department has been working on practical standards for grades of beef, etc., in conjunction with its standardisation programme for livestock and other products of the farms. As a result, tentative standards for classes and grades of beef were offered for market-reporting purposes in 1916. After thorough tests these standards were later made official for the country, and are now being used generally by the livestock and meat industries. This leaflet gives an account of the development of the system, and particulars of the qualifications of graders and of how beef grading and stamping are carried out.

Apple Recipes. Bulletin, No. 35 (revised edition). Fruit Branch, Dept. of Agriculture, Ottawa, 1930.

Contains a good selection of domestic recipes.

Feeding Chickens. Farmers' Bulletin No. 1541, U.S. Department of Agriculture. Issued 1927; revised May, 1931.

Efficient feeding practices are necessary to make poultry raising most profitable and to produce the best quality of products. The feed is the most important cost factor in raising poultry. Therefore, the selection of feeds and the method of feeding are very important matters.

In feeding all classes of poultry a proper balance of the various nutrients is necessary, especially proteins, carbohydrates, minerals, and vitamins.

In this bulletin the relative value of the different nutrients is discussed and methods of feeding chickens for different purposes are outlined.

This bulletin supersedes Farmers' Bulletin 1067, *Feeding Hens for Egg Production.*

New Companies

LODGE CANNING COMPANY, LIMITED. (261339.) To take over the bus. of distributors of and dlrs. in preserved and canned goods cd. on at 11, Swaine Street, Bradford, as "The Lodge Canning Co." Nom. Cap.: £2,500 in £1 shares.

BRITISH BREAKFAST BEVERAGES, LIMITED. (261430.) To carry on the bus. of importers and brokers of and dlrs. in tea, coffee, cocoa, etc. Nom. Cap.: £100 in £1 shares.

CANNING (GREAT BRITAIN), LIMITED. (261432.) King William Street House, Arthur Street, E.C. 4. To carry on the bus. of canners and preservers of foodstuffs. Nom. Cap.: £1,000 in 800 pref. shares of £1 and 800 ord. of 5s. Dirs.: To be appointed by the subs. Qual. of dirs. (except 1st dirs.): £200 shares or stock. Remun. of dirs.: £200 each per annum (ch. £300) and a percentage of profits.

TAPAH EGG COMPANY, LIMITED. (262253.) Branxholme Farm, Cade Street, Heathfield, Sussex. To carry on the bus. of poultry and game farmers, etc. Nom. Cap.: £3,000 in £1 shares.

HERSHAM CRISPS, LIMITED. (261375.) Esher Road, Hersham, Walton-on-Thames, Surrey. To take over the bus. cd. on as "Stamford's Hersham Crisps" at Hersham; and to carry on the bus. of potato crisps mnfrs., etc. Nom. Cap.: £10,000 in £1 shares.

HELTHEA, LIMITED. (261374.) 166, Midland Road, Leyton, E. 10. To carry on the bus. of hygienic packet food producers, etc. Nom. Cap.: £1,000 in £1 shares (700 pref. and 300 ord.).

YEO, SON AND SMITH, LIMITED. (261353.) To take over the bus. of wholesale confectioners cd. on as "Yeo and Son." Nom. Cap.: £2,000 in £1 shares.

DEIRA POULTRY PRODUCTS, LIMITED. (262427.) To carry on the bus. of cowkeepers, dairymen, farmers, etc. Nom. Cap.: £2,000 in £1 shares.

BRADFORD BY-PRODUCT AND FERTILISER COMPANY, LIMITED. (261359.) 25, Sunbridge Road, Bradford. To carry on the bus. of dlrs. in the blood of animals, extractors therefrom, or mnfrs. of and dlrs. in serum, gum, nitrates, fertilisers, etc. Nom. Cap.: £100 in £1 shares.

C. F. SWIFFEN AND SON, LIMITED. (262119.) To take over the bus. of a sugar and colonial produce mcht. cd. on by C. F. Swiffen at 3, Moncrieffe Road, Sheffield. Nom. Cap.: £15,000 in £1 shares (5,000 pref. and 10,000 ord.).

CARDIFF DIRECT FISH DISTRIBUTION COMPANY, LIMITED. (262420.) To carry on the bus. of mchts. and dlrs. in fish, poultry, etc. Nom. Cap.: £500 in £1 shares.

W. WIDDOWSON, LIMITED. (262257.) To take over the bus. of a dlr. in yeast, scales, weighing and automatic machines, etc., cd. on as "W. Widdowson" at 25, Warren Street, Stockport. Nom. Cap.: £2,000 in £1 shares.

DEVON AND DORSET DAIRIES, LIMITED. (262121.) 37 to 38, Fenchurch Street, E.C. 2. To take over the bus. cd. on by Devon and Dorset Dairies, Ltd. Nom. Cap.: £10,000 in 6,000 pref. shares of £1 and 8,000 "A" ord. and 8,000 "B" ord. of 5s.

TESCO STORES, LIMITED. (262254.) To carry on the bus. of dlrs. in teas under the name of "Tesco Teas," and that of grocers, shopkeepers, etc., and to acquire a joint interest in the trade-mark "Tesco" and the goodwill in connection therewith, etc. Nom. Cap.: £2,000 in £1 shares.

H. ROGERS AND SONS, LIMITED. (261371.) 39, London Road, Twickenham, Middlesex. To carry on the bus. of dlrs. in and producers of dairy, farm and garden produce, etc. Nom. Cap.: £5,000 in £1 shares.

BRITISH NAVARRE MACHINERY COMPANY, LIMITED. (262089.) To carry on the bus. of mnfrs. of and dlrs. in canning and shelling machines, etc. Nom. Cap.: £200 in £1 shares.

Irradiated Cereal Products

IN recent years there has been a great increase in the treatment of foods by ultra-violet light, and a large number of patents have been taken out for equipment as well as for processes. In the current issue of *Cereal Chemistry* an interesting review of patents and the application thereof, involving irradiated cereal products, is given by E. S. Stateler, of New York. Probably one of the patents which has attracted the greatest interest is Steenboek's patent, entitled "Antirachitic Product and Process," taken out in Great Britain in 1924. It covers the imparting of antirachitic properties to dietary organic substances such as carbohydrate foods, fats, oils, etc. These foods are subjected to the ultra-violet rays produced by a quartz mercury vapour lamp for a period sufficient to effect antirachitic activation, but so limited as to avoid subsequent deterioration of the antirachitic substances or the palatability of the foods so treated.

A very interesting patent is that taken out by Sperti and his co-workers at the University of Cincinnati on July 10, 1928. This covered the sterilisation and activation of food by selective irradiation by ultra-violet light. This patent led to the formation of General Development Laboratories, Inc., by the University of Cincinnati and General Foods Corporation. The principle is to select quantitatively the specific range of ultra-violet rays that tests show to be specific in action to give the desired results. The work of Sperti showed that bacteria are killed by light rays with wave-lengths beginning at approximately 2,750 Ångström units, that enzymes are rendered inactive by light rays of lengths of 2,420 Ångström units and shorter. Radiation of wave-lengths greater than 2,750 units do not kill bacteria, and if the rays with wave-lengths of greater than 2,400 and not less than 2,750 Ångström units are utilised the bacteria are killed without inactivating the enzymes. A filter screen filled with 5 per cent. lead acetate in pure water gives the desired effect. The General Development Laboratories, Inc., has not yet made commercial application of the Sperti process, but plans and arrangements are progressing to that end, and an early public announcement is expected. Meanwhile most of the commercial irradiation of foods is being carried out by license from the Wisconsin Alumni Research Foundation, assignee of the Steenbock patent.

The Quaker Oats Co. has obtained license to irradiate at least two of its cereal products, and many other commercial food concerns are taking the matter up.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

HONEY DEW.—516,903. **Canned fruits, but not including pineapple, and not including any goods of a like kind to pineapple.** HAWAIIAN PINEAPPLE CO., LTD., Iwilei Road, Honolulu, Hawaii. April 29. (Associated.)

KIA-ORA, NEW ZEALAND.—519,456. **Butter, cheese, and milk.** KIA-ORA CO-OPERATIVE DAIRYING CO., LTD., Gisborne, New Zealand. April 29. (By Consent.)

TALISMALT.—520,519. **A preparation containing malt for use as food or as an ingredient in food.** FABRIQUE DE CHOCOLAT ET DE PRODUITS ALIMENTAIRES DE VILLARS, Société Anonyme, Perolles, Fribourg, Switzerland. April 29.

ZENITH.—520,854. **Essences, flavourings, and colourings (all non-alcoholic) for use as food or as ingredients in food.** STEVENSON AND HOWELL, LTD., Standard Works, 95a, Southwark Street, London, S.E. 1. April 29. (Associated.)

SPEEDWAY.—521,414. **Fruits and vegetables (for food).** JOSEPH BLOWER DRING, The Model Factory, Norfolk Street, Boston, Lincolnshire. April 29. (Associated.)

GLENROSE.—521,469. **Tea.** WILLIAM ALFRED BEERE, 15a, St. Mark's Road, Dalston, London, E. 8. April 29.

NOGASA.—521,484. **Nougat, being a sweetmeat.** NAAMLOOZE VENNOOTSCHAP HOLLANDSCHE CACAO EN CHOCOLADE-FABRIEKEN VOORHEEN BENSDORP AND CO., Nieuw Spiegelstraat 9, Bussum, Holland. April 29.

BONNE MAMAN.—518,543. **Preserved meats, preserved vegetables, and preserved fruit, all in tins or in glass or earthenware containers.** LOUIS ETIENNE ROLLAND, 38, Abinger Road, Chiswick, London, W. 4. April 22. (By Consent.)

SHIELDHALL.—508,856. **Coffee essence, fruit essences (non-alcoholic), sponge mixture, milk-pudding mixture, custard powder, blancmange powder, ground rice, table jellies, relish, ketchup, pickles, chutney, tomato sauce, mustard sauce, curry powder, ground pimento, ground cinnamon (for food), ground caraway seeds, ground cloves, ground ginger, pepper, mixed spice, nutmegs, mustard (for food), gravy salt, sweetmeats, lemon curd, and bird-seed.** THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., 95, Morrison Street, Glasgow. April 22.

TAZMA.—519,652. **Tea.** W. GOODFELLOW AND CO., 2, Grove Place, Bedford. February 25.

ACME.—519,738. **Salt for food.** J. MANGER AND SON, LTD., 57, High Street, Kingsland, London, E. 8. February 25.

ROUVINE.—516,413. **Preparations for use in making gravies, soups, and sauces.** ERNEST VERNON VARLEY, 59, Thurlby Road, West Norwood, London, S.E. 27. February 18.

TRUBAND.—519,125. **Tea.** WILLIAM WRIGHT AND CO., 7, York Street, Glasgow. February 18.

WEEKLY.—521,426. **Confectionery and chocolate.** JAMES PASCALL, LTD., 100, Blackfriars Road, London, S.E. 1. May 13. (Associated.)

KRUSKO.—519,544. **Sausages, and fillings and binders (being ingredients) for sausages.** ARTHUR J. HARRIS AND CO., LTD., Smithfield Spice Mills, 44 and 46, Upper Milk Street, Tithebarn Street, Liverpool. May 19. (By Consent.)

CHANTICLEER.—519,970. **Bacon and butter.** I. BEER AND SONS, LTD., 15, King Street, Snow Hill, London, E.C. 1. May 13. (Associated.)

LINERS.—526,153. **Sweetmeats.** ALBERT KEYWORTH, trading as Keyson Confectionery Co., 48a, Carlton Road, Worksop, Nottingham. November 4.

KRAFCO.—525,921. **All goods in Class 42, which includes bread, biscuits, etc., but not including tea and not including any goods of a like kind to tea.** KRAFT CHEESE CO., LTD., Silverdale Rd., Hayes, Middlesex. November 4. (Associated.)

MADOLA.—524,210. **Biscuits.** NEWBALL AND MASON, LTD., 90, Beech Avenue, Nottingham. October 28.

SANSA.—524,814. **Preserved fish.** J. SAINSBURY, LTD., Stamford House, Stamford Street, Blackfriars, London, S.E. 1. October 28. (By Consent.)

DIVVYDAINTIES.—524,975. **Custard powder, blancmange powder, baking powder, egg powder, jellies (for food), and lemon cheese.** ARTHUR SUTCLIFFE, 1, Brooks Road, Old Trafford, Manchester. October 28.

MAORI QUEEN.—525,683. **New Zealand butter.** PILGRIM BROS., LTD., also trading as Harvey Bradfield and Toyer, 1, Rucklidge Avenue, Harlesden, London, N.W. 10. October 28.

SILVER SCREEN.—523,722. **Chocolate and confectionery.** ROWNTREE AND CO., LTD., The Cocoa Works, Wigginton Road, York. October 21. (By Consent.)

MAPLE LEAF.—522,696. **Preserved, canned, dried, bottled, and fresh fruit and vegetables (for food).** MORISON AND JONES (BROKERS), LTD., Peek House, 20, Eastcheap, London, E.C. 3. October 21.

DALESBURY.—524,404. **Butter.** E. M. DENNY AND CO., LTD., Hibernia Chambers, London Bridge, London, S.E. 1. October 21.

NEO-CERES.—523,999. **Edible oils and fats.** GEORG SCHICHT AKTIEN GESELLSCHAFT, Dresdnerstrasse 34, Aussig, Czecho-Slovakia. September 16. (Associated.) (By Consent.)

TREASURE CHEST.—523,642. **Sugar confectionery.** J. LYONS AND CO., LTD., Cadby Hall, Hammersmith Road, Kensington, London, W. 14. September 16.

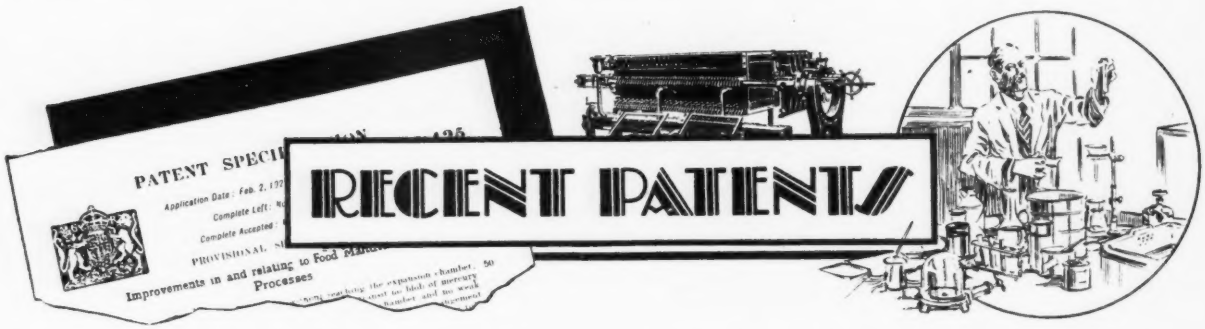
Milk Straining

MILK should be produced under careful sanitary conditions, but nevertheless it needs straining. Milk is strained to remove most of the visible sediment to improve its appearance. Filtration refers to the complete removal of all visible sediment. It is not essential and it is rather difficult to remove all visible sediment from milk on the farm. Straining is ample, as milk must be filtered or clarified at the milk plant.

Single-service cotton or flannel discs or squares are generally employed. Cloth is more satisfactory, due to greater capacity, even though cotton removes more sediment. Most strainers using cotton handle so little milk that their value is questionable. Cotton is recommended for milk sold raw which cannot be filtered or clarified at the milk plant and for those dairies where exceptionally good sediments are desired and small capacity is not important.

The capacity of a strainer decreases with low temperatures and with high fat content of the milk.

Cloths or cotton discs or squares clog with small amounts of butter fat even when very clean milk is being strained. (*New York State Agr. Exp. Sta. Bulletin No.* 585, by A. C. Dahlberg.)



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Latest Patent Applications

2174. BEAL, F. A., and BEAL, J. E., and GARNER, F. T.: Slicing appliances. January 25.
2186. CANNON (IRON FOUNDRIES), LTD.: Domestic mincing machines. January 25.
2191. CROSLAND, E. M.: Manufacture of biscuits, etc. January 25.
1333. CROSSE AND BLACKWELL, LTD.: Sterilisation of foodstuffs. January 16.
939. PAYNE AND CO., LTD., G.: Cocoa, etc., presses. January 12.

Specifications Published

365,530. LAVENDER, P. C., and SHERMAN, A. E.: Method of preserving fish.
365,086. BERTEL, R., and SCHUSSLER, O.: Manufacture of yeast.
364,656. CARR AND CO., LTD., and FURNESS, H.: Machinery for making biscuits and like baked products.
365,007. RAFFINERIE TIRLEMONTOISE SOC. ANON.: Production of sugar from beetroots, cane, and other plants.
364,183. CORNELL, E. L.: Device for separating cream from milk.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2., at the uniform price of 1s. each.

Abstracts Published

Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

358,153. **Packing confectionery.** LOEBEN, W., 28, Grosser Zimmerhof, Wolfenbüttel, Germany.
Artificial fruits and the like with edible centres consisting of chocolate or having a chocolate surface are made by covering the centre with metal foil, dipping into a solution of wax in a suitable solvent—*e.g.*, a solution of paraffin wax in paraffin oil and petroleum ether—and allowing to dry. Two metal foils may be wrapped round the centre before the application of the layer of wax. The metal foil and/or the wax may be coloured or painted, while the layer of wax may be coated with colourless varnish.

The specification as open to inspection under Sect. 91 (3) (a) refers to the use of edible centres generally. This subject-matter does not appear in the specification as accepted.

361,259. **Preserving food, etc.** SUTCLIFFE, J. W., 10, Charterhouse Street, Holborn Circus, London.
In preserving food, etc., by enclosure in jars, bottles, or other containers, the air space between the cap and the top of the contents being sterilised by heating, a shield is provided having a partition with perforations for shielding all but the caps of the containers during the heating, and having a depending flange which surrounds and protects a group of the containers. Depending flanges may be mounted on the lower side of the partition around each perforation. An upstanding flange provides an enclosed heating space above the caps. The containers may be inserted in a skeleton cage or may be carried past automatic filling and capping machines and the sterilising machine by a continuous conveyor having transverse and longitudinal slats for grouping the containers.

360,332. **Cocoa preparations.** HANSEATISCHE MUEHLENWERKE AKT.-GES., 3, Alsterdamm, Hamburg, Germany.
A small proportion—*e.g.*, 0·2 to 1·5 per cent.—of lecithin, alone or mixed with cocoa butter, is added to finely ground prepared cocoa beans prior to pressing out the fat. Lecithin from soya beans is suitable. The prior use of honey, sugar solutions, milk, malt extract, fruit syrup, and vegetable mucilage for the same purpose as the lecithin is referred to.

360,511. **Coffee-infusing machines.** KRAUSE, R. F., of Enterprise Aluminium Co., Massillon, Ohio, U.S.A.
Infusing machines of the type having an upper water container with a perforated base and a lower coffee container are constructed with a perforated annular shoulder towards the base of the water container, the wall of the container below this shoulder being imperforate.

342,083. **Milk preparations; confectionery.** AXELROD, A., 45, Hadlaubstrasse, Zurich, Switzerland.
Milk products, more particularly for use in baking, are obtained by treating skimmed or other milk freed from bacteria by pasteurising, etc., with peptonising bacteria—*e.g.*, *B. caucasicus* or *B. acidophilus*—which produce no, or little, lactic acid—*i.e.*, less than *B. bulgaricus*—and thereupon converting into dried form. Preferably, before drying, the precipitate obtained is finely divided by treatment in a homogeniser or similar apparatus or with one or more peptonising agents—*e.g.*, alkali metal salts of phosphoric or citric acid, such as disodium orthophosphate—which may be added at the beginning of or during the precipitation. The small amount of acid formed may be neutralised before drying. The product may be used to replace 20 per cent. or more of the flour used in baking and may also be employed in the manufacture of biscuits, cakes, chocolates, and pralines, etc., in the same manner as milk powder.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.